BUREAU OF ADMINISTRATION
320 North Nicollet Avenue
PIERRE, SD 57501-5070
PHONE 605.773.3688
FAX 605.773.3887
https://boa.sd.gov/

REQUEST FOR MULTI-AGENCY LEASED OFFICE SPACE

PROPOSALS ARE DUE NO LATER THAN 05/15/2020 (3:00PM CT)

BOA# ASW20--04X BOA POC: Kevin Fridley EMAIL: Kevin.Fridley@state.sd.us

READ CAREFULLY

OFFEROR NAME: _____ AUTHORIZED SIGNATURE: _____

ADDRESS: _____ TYPE OR PRINT NAME: _____

CITY/STATE: _____ TELEPHONE NO: _____

ZIP (9 DIGIT): _____ FAX NO: _____

FEDERAL TAX ID#: _____ E-MAIL: _____

PRIMARY CONTACT INFORMATION

CONTACT NAME: _____ TELEPHONE NO: _____

FAX NO: _____ E-MAIL: _____

1.0 GENERAL INFORMATION

1.1 PURPOSE OF REQUEST FOR PROPOSAL (RFP)

The Bureau of Administration (BOA), on behalf of the State of South Dakota, is soliciting Proposals for Leased Office Space from Offerors interested in providing new or renovated office space as described in this Request for Proposal for Leased Office Space, the preliminary plans, and the building specification. The project scope will involve the full design, construction (new construction or remodeling existing space are both acceptable), and lease agreement for the Multi-Agency Leased Space Building in Rapid City, South Dakota. The project will need to be completed by August 2021 or sooner.

1.2 ISSUING OFFICE AND RFP REFERENCE NUMBER

The South Dakota Bureau of Administration ~~is~~ the issuing office for this document and all subsequent addenda relating to it. The reference number for the transaction is BOA# ASW20--04X. This number must be referred to on all proposals, correspondence, and documentation relating to the RFP.

1.3 SCHEDULE OF ACTIVITIES (SUBJECT TO CHANGE)

RFP Publication	03/30/2020
Deadline for Submission of Inquiries	04/27/2020 (5:00PM CT)
Responses to Offeror Questions	05/04/2020
Proposal Submission	**05/15/2020 (3:00PM CT)**
Anticipated Award Decision/Contract Negotiation	06/15/2020

1.4 SUBMITTING YOUR PROPOSAL

All proposals must be completed and received by the date and time indicated in the Schedule of Activities.

Proposals received after the deadline will be late and ineligible for consideration.

Copies of the Leased Space Proposal must be submitted by 3:00 PM CT on May 15, 2020. Please send an electronic copy (electronic only, no paper copies) per Section 5.0 to the following:

Kevin Fridley
Bureau of Administration
500 E Capitol Avenue
Pierre, SD 57501-3182
Phone: 605-773-4265
E-mail: Kevin.Fridley@state.sd.us

No proposal shall be accepted from, or no contract or purchase order shall be awarded to any person, firm or corporation that is in arrears upon any obligations to the State of South Dakota, or that otherwise may be deemed irresponsible or unreliable by the State of South Dakota.

1.5 CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION – LOWER TIER COVERED TRANSACTIONS

By signing and submitting this proposal, the offeror certifies that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily

excluded from participation, by the federal government or any state or local governmental department or agency. Where the offeror is unable to certify to any of the statements in this certification, the bidder shall attach an explanation to their offer.

1.6 NON-DISCRIMINATION STATEMENT

The State of South Dakota requires that all contractors, vendors, and suppliers doing business with any State agency, department, or institution, provide a statement of non-discrimination. By signing and submitting their proposal, the offeror certifies they do not discriminate in their employment practices with regard to race, color, creed, religion, age, sex, ancestry, national origin or disability.

1.7 RESTRICTION OF BOYCOTT OF ISRAEL

For contractors, vendors, suppliers, or subcontractors with five (5) or more employees who enter into a contract with the State of South Dakota that involves the expenditure of one hundred thousand dollars ($100,000) or more, by submitting a response to this solicitation or agreeing to contract with the State, the bidder or offeror certifies and agrees that the following information is correct:

The bidder or offeror, in preparing its response or offer or in considering proposals submitted from qualified, potential vendors, suppliers, and subcontractors, or in the solicitation, selection, or commercial treatment of any vendor, supplier, or subcontractor, has not refused to transact business activities, has not terminated business activities, and has not taken other similar actions intended to limit its commercial relations, related to the subject matter of the bid or offer, with a person or entity on the basis of Israeli national origin, or residence or incorporation in Israel or its territories, with the specific intent to accomplish a boycott or divestment of Israel in a discriminatory manner. It is understood and agreed that, if this certification is false, such false certification will constitute grounds for the State to reject the bid or response submitted by the bidder or offeror on this project and terminate any contract awarded based on the bid or response. The successful bidder or offeror further agrees to provide immediate written notice to the contracting executive branch agency if during the term of the contract it no longer complies with this certification and agrees such noncompliance may be grounds for contract termination.

1.8 MODIFICATION OR WITHDRAWAL OF PROPOSALS

Proposals may be modified or withdrawn by the offeror prior to the established proposal submission date and time.

No oral, telephonic, telegraphic or facsimile responses or modifications to informal, formal bids, or Request for Proposals will be considered.

1.9 OFFEROR INQUIRIES

Offerors may email inquiries concerning this RFP to obtain clarification of requirements. No inquiries will be accepted after the date and time indicated in the Schedule of Activities. Inquiries must be emailed to Kevin Fridley at Kevin.Fridley@state.sd.us with the subject line “BOA# ASW20--04X”.

The Bureau of Administration will respond to offeror’s inquiries (if required) via e-mail. Offerors may not rely on any other statements, either of a written or oral nature, that alter any specification or other term or condition of this RFP. Offerors will be notified in the same manner as indicated above regarding any modifications to this RFP.

1.10 PROPRIETARY INFORMATION

The proposal of the successful offeror(s) becomes public information. Proprietary information can be protected under limited circumstances such as client lists and non-public financial statements. An entire proposal may not be marked as proprietary. Offerors must clearly identify in the Executive Summary and mark in the body of the proposal any specific proprietary information they are requesting to be protected. The Executive Summary must contain specific justification explaining why the information is to be protected. Proposals may be reviewed and evaluated by any person at the discretion of the BOA. All materials submitted become the property of the State of South Dakota and may be returned only at the State's option.

1.11 LENGTH OF AGREEMENT AND RENEWAL OPTION

It is the intent of the BOA to enter into a 20-year lease with the option to renew for additional years. However, Offeror can present additional options.

1.12 GOVERNING LAW

Venue for any and all legal action regarding or arising out of the transaction covered herein shall be solely in the State of South Dakota, Hughes County. The laws of South Dakota shall govern this transaction.

1.13 DISCUSSIONS WITH OFFERORS

An oral presentation by an offeror to clarify a proposal may be required at the sole discretion of the BOA. However, the BOA may award a contract based on the initial proposals received without discussion with the Offeror. If oral presentations are required, they will be scheduled after the submission of proposals. Oral presentations will be made at the offeror's expense.

2.0 STANDARD CONTRACT TERMS AND CONDITIONS

2.1 STANDARD LEASE AGREEMENT

Any contract or agreement resulting from this RFP will include the State's standard lease agreement as attached hereto as Exhibit A, along with any additional terms and conditions as negotiated by the parties.

3.0 SCOPE OF WORK

3.1 BACKGROUND INFORMATION

The BOA is authorized to provide for the lease of real property as shall be necessary for the operation of state government.

3.2 OVERVIEW

The BOA seeks a proposal to design and construct or remodel a building in Rapid City, South Dakota, for lease by multiple state agencies, to be completed by August 2021 or sooner to the BOA's satisfaction, and enter into lease agreements with state agencies to lease such building

space for 20 years, with the option to renew for additional years (or other lengths of term as negotiated). The Offeror will be responsible for design; submission to the BOA for review/approval; and construction of the facility as agreed upon by all parties. All design and construction expenses will be at the Offeror's sole expense. Preliminary plans and building standards (supplied for reference as an example only) are attached to this agreement as Exhibit B and C.

The Offeror shall comply with all applicable federal, state, and local laws, regulations, and codes, including but not limited to fire and life safety regulations, equal accessibility for the handicapped and disabled specifically conforming to, but not limited to, the Americans with Disabilities Act (ADA), and local and planning ordinances. The Offeror shall be responsible for satisfying the requirements associated with compliance, at the Offeror's expense.

The BOA, State, and agencies will not be responsible for any expenses incurred by the Successful Offeror in its performance of the project, other than payment of the lease rate pursuant to the terms contained within the lease agreement, once such agreement becomes effective.

3.3 PROJECT DETAILS

The Offeror shall provide new or renovated office space for lease by approximately 6 state agencies.

a. **Location.** Rapid City area.

b. **Dimensions.** The office space shall consist of approximately 95,000 square feet to accommodate approximately 340 staff, located in one building which can be one level or multi-level; approximately 95,000 square feet of parking of which approximately 16,000 square foot shall be secured parking.

c. **Accessibility.** The leased space must be accessible by way of public transportation.

d. **Completion Date.** All work shall be completed by August 2021 or sooner to the BOA's satisfaction.

e. **Furnishings.** The State of South Dakota will provide all office furnishings, to include systems furniture and furniture for reception areas, breakroom areas, conference rooms, etc.

3.4 LEASE AGREEMENT

Separate leases will be signed with each agency; total common areas will be divided amongst agencies. Leases are to be signed upon completion of building design as agreed to by all parties, and shall be effective upon completion of construction and move-in. The state's standard lease will be used, attached hereto as Exhibit A. Lease shall be null and void if construction is not completed by August 2021 or other date as agreed to by the parties, with an extension to be granted at the BOA's discretion. It is the intent of the BOA to enter into a 20-year lease with the option to renew for additional years. However, Offeror can present additional options.

3.5 PRELIMINARY PLANS AND BUILDING STANDARDS

Attached hereto are preliminary plans (Exhibit B) and building standards (Exhibit C) to be used as an example for informational purposes only. The preliminary plans and building standards are

solely for the purpose of showing the individual agency space needs, square footage requirements, unique office requirements, etc. The preliminary plans and building standards shall not be used for construction but shall give the Offeror a starting point for their own design based on their location capabilities.

Selected Offeror must submit their own plans and specifications. The BOA has the right to negotiate submitted plans and specifications based upon the requirements and needs of each agency. The Offeror shall submit design plans to the BOA throughout design for the BOA's review and comment to ensure plans meet requirements and needs to each agency. The Officer shall also host progress meetings upon request by the BOA.

3.6 TOBACCO USE

It is State of South Dakota policy that tobacco use is not allowed on State property or within State buildings. Final design shall detail designated exterior smoking area.

3.7 EMERGENCY BACK-UP POWER

Final design may require plans for emergency back-up power which will ensure continuity of operations for some tenants of the building.

3.8 SECURITY

Building shall be designed with a secure entrance and whole building security to ensure safety of employees, property, and the public. Security shall include but not be limited to wiring for cameras in secure parking area, exterior entrances, and public lobbies as well as card access throughout the building as detailed in the Building Standards.

4.0 PROPOSAL REQUIREMENTS AND COMPANY QUALIFICATIONS

4.1 NUMBER OF PROPOSAL SUBMISSIONS

Offerors may submit more than one proposal in response to this RFP. Each proposal shall be submitted individually.

4.2 PROPOSAL INFORMATION

The offeror is cautioned that it is the offeror's sole responsibility to submit information related to the evaluation categories and that the State of South Dakota is under no obligation to solicit such information if it is not included with the proposal. The offeror's failure to submit such information may cause an adverse impact on the evaluation of the proposal.

4.3 OFFEROR'S CONTACTS

Offerors and their agents (including subcontractors, employees, consultants, or anyone else acting on their behalf) must direct all of their questions or comments regarding the RFP, the evaluation, etc. to the BOA Point of Contact of record indicated on the first page of this RFP. Offerors and their agents may not contact any state employee other than the BOA Point of Contact regarding any of these matters during the solicitation and evaluation process. Inappropriate contacts are grounds for suspension and/or exclusion from specific procurements.

Offerors and their agents who have questions regarding this matter should contact the BOA Point of Contact.

4.4 OFFEROR'S FINANCIAL DOCUMENTS

The offeror may be required to submit a copy of their most recent audited financial statements and bank reference letter upon the BOA's request.

4.5 OFFEROR'S PAST PERFORMANCE

Provide the following information related to at least three previous and/or current projects, performed by the offeror's organization, which are similar to the requirements of this RFP. Provide this information for any service/contract that has been terminated, expired or not renewed in the past three years.

a. Name, address and telephone number of client/contracting agency and a representative of that agency who may be contacted for verification of all information submitted;

b. Dates of the project; and

c. A brief, written description of the specific prior services performed and requirements thereof.

5.0 PROPOSAL RESPONSE FORMAT

5.1 PROPOSAL FORMAT

The offeror should provide one (1) copy of each proposal, including all attachments, in Microsoft Word or PDF electronic format via email, as required in Section 1.4. Offeror may submit multiple proposals; proposals shall be submitted individually.

The proposal should be page numbered and should have an index and/or a table of contents referencing the appropriate page number.

5.2 PROPOSAL HEADINGS

All proposals must be organized and tabbed with labels for the following headings:

a. **RFP Form**. The BOA's Request for Proposal form completed and signed.

b. **Executive Summary.** The one- or two-page executive summary is to briefly describe the offeror's proposal. This summary should highlight the major features of the proposal. It must indicate any requirements that cannot be met by the offeror. The reader should be able to determine the essence of the proposal by reading the executive summary. Proprietary information requests should be identified in this section.

c. **Detailed Response.** This section should constitute the major portion of the proposal and must contain at least the following information:

1. A complete narrative of the offeror's assessment of the work to be performed, the offeror's ability and approach, and the resources necessary to fulfill the requirements. This should demonstrate the offeror's understanding of the desired overall performance expectations.

2. A specific point-by-point response, in the order listed, to each evaluation criteria per Section 6.1 in the RFP. The response should identify each requirement being addressed as enumerated in the RFP.

3. A clear description of any options or alternatives proposed.

6.0 PROPOSAL EVALUATION AND AWARD PROCESS

6.1 EVALUATION CRITERIA

After determining that a proposal satisfies the mandatory requirements stated in the Request for Proposal, the evaluator(s) shall use subjective judgment in conducting a comparative assessment of the proposal by considering each of the following criteria:

a. Specialized expertise, capabilities, and technical competence as demonstrated by the proposed approach and methodology to meet the project requirements; *(15 pts)*

b. Resources available to perform the work, including any specialized services, within the specified time limits for the project; *(5 pts)*

c. Record of past performance, including price and cost data from previous projects, quality of work, ability to meet schedules, cost control, and contract administration; *(10 pts)*

d. Availability to the project locale (defined as Rapid City area); *(5 pts)*

e. Familiarity with the project locale (defined as Rapid City area); *(5 pts)*

f. Proposed project management techniques; *(5 pts)*

g. Ability and proven history in handling special project constraints; *(5 pts)*

h. Summary of proposed schedule including design schedule, Construction Milestones, and Project Completion. *(30 pts)*

i. Proposed site location. *(20 pts)*

6.2 OFFEROR'S EXPERIENCE

Experience and reliability of the offeror's organization are considered subjectively in the evaluation process. Therefore, the offeror is advised to submit any information which documents successful and reliable experience in past performances, especially those performances related to the requirements of this RFP.

6.3 OFFEROR'S PERSONNEL QUALIFICATIONS

The qualifications of the personnel proposed by the offeror to perform the requirements of this RFP, whether from the offeror's organization or from a proposed subcontractor, will be subjectively evaluated. Therefore, the offeror should submit detailed information related to the experience and qualifications, including education, licensure, and training, of proposed contractors, designers, and other personnel.

6.4 REJECTION OF PROPOSALS

The BOA reserves the right to reject any or all proposals, waive technicalities, and make award as deemed to be in the best interest of the State of South Dakota.

6.5 AWARD

This process is a Request for Proposal/Competitive Negotiation process. Each Proposal shall be evaluated, and each respondent shall be available for negotiation meetings at the BOA's request. The BOA reserves the right to negotiate on any and/or all components of every proposal submitted. From the time the proposals are submitted until the formal award of a contract, each proposal is considered a working document and as such, will be kept confidential. The negotiation discussions will also be held as confidential until such time as the award is completed.

A technical review committee will review the proposals and select a shortlist of offerors. Those offerors may be interviewed in order for the BOA to make a final decision. Thereafter the BOA and the selected offeror shall discuss and refine the scope of services for the project and negotiate lease terms and lease rate.

6.6 LEASE AGREEMENT

The lease space agreement will be negotiated with the BOA for each individual agency and the selected offeror, based on a 20-year lease with the option to renew for additional years. Offeror may submit alternate options.

a. If the BOA and the highest ranked offeror are unable for any reason to negotiate an agreement that is reasonable and fair to the agency, the BOA shall, either orally or in writing, terminate negotiations with the contractor. The BOA may then negotiate with the next highest ranked offeror.

b. The negotiation process may continue through successive offerors, according to BOA ranking, until an agreement is reached or the BOA terminates the RFP process.

7.0 COMPLIANCE ITEMS

7.1 Compliance Items: (To the right of each item, enter YES if you will comply or NO if you will not)

a. The leased office space will be accessible by way of public transportation.

b. Agrees to all Terms and Conditions with the Lease Agreement.

c. Will follow BOA Carpet Standards

d. Will follow BOA LVT Standards

e. Will follow BOA Paint Color Standards

f. Will follow BIT Wiring Specification

g. Will follow BIT Door Security Requirements

h. Will follow BOA Standard Office Dimensions

i. Will follow and comply with all applicable local, state, and national codes and regulations

*** Failure to comply with all compliance items may be grounds for bid rejection.

EXHIBIT A

STANDARD LEASE AGREEMENT

STATE OF SOUTH DAKOTA
LEASE AGREEMENT
LEASE#: DRAFT Multi Agency Office Rapid City

THIS LEASE is made and entered on this 1st day of July 2021, by and between the State of South Dakota, Office of Executive Management, Bureau of Administration on behalf of the **Department of** , hereafter referred to as "Tenant", and **XYZ Company**, hereafter referred to as "Landlord".

This lease is in accordance with and incorporates the Request for Multi-Agency Leased Office Space Solicitation, RFP: BOA # ASW20--04X, and Landlord's response to the Solicitation.

IN CONSIDERATION of the mutual covenants contained in this lease and the terms and conditions hereinafter set forth, the parties agree as follows:

SECTION 1
LEASED PREMISES

1.1) Description of Premises. Landlord leases to Tenant and Tenant leases from Landlord certain real property, hereinafter referred to as the "Premises", which includes the building and other related improvements located at:

Address: **TBD**
City: **Rapid City** State: **SD** Zip: **57701**
County: **Pennington**

The leased premises consist of an area of approximately _____ square feet within the building.

Landlord agrees to construct/remodel the Premises in accordance with the plans and specifications as mutually agreed by the parties in writing. All work shall be completed on schedule as mutually agreed by the parties. In completing the work, the Landlord shall comply with all applicable laws and regulations of the State of South Dakota and the Federal Government and all applicable municipal ordinances. Landlord agrees to construct or remodel the building at Landlord's sole expense. If the construction/remodel is not completed by August 2021 (or other date as agreed to by the State), the Lease is null and void.

1.2) Quiet Enjoyment. Landlord covenants and agrees, so long as Tenant is not in default under the terms of this Lease, to provide quiet and peaceful possession of the Premises and that Tenant may enjoy all of the rights granted without interference.

SECTION 2
TERM

2.1) Term. The term of this Lease will be for a period of **20** years commencing on **July 1, 2021** and ending on **June 30, 2041**.

SECTION 3
RENT

3.1) Rent. Tenant agrees to pay to Landlord, at Landlord's address as set forth in Section 11 herein, equal monthly installments of $**TBD** during the term of this Lease, which is computed at a rate of **$TBD** per square foot per year. Rental payments will commence on July 1, 2021 and are due the first day of each month thereafter through the conclusion of the lease term.

Tenant and Landlord agree to review the Lease rate no earlier than three months prior to the end of the fifth, tenth and fifteenth anniversaries of the Lease for the next 5-year term. Any adjustment to the Lease rate must be justified, will be made by an amendment to the Lease and will not be effective until on or after the above anniversary dates of the Lease, as indicated in the amendments. Tenant may move into the Premises prior to the start date.

3.2) Grace Period. Landlord agrees that Tenant will have a fifteen day grace period after each rent payment is due during which no penalty or interest will be accrued. Landlord agrees that Tenant will not be considered in default if payment of rent is made within the fifteen day grace period.

SECTION 4
TAXES, ASSESSMENTS AND UTILITIES

4.1) Taxes and Assessments. Landlord agrees to pay, when due, all taxes of any kind, general or special, foreseen or unforeseen, of any nature whatsoever, and installments of special assessments thereof which may be taxed or imposed on the Premises, including the improvements.

4.2) Utilities and Services are to be paid to vendor by either Landlord or Tenant as indicated below if applicable and if a service does not exist then a N/A will suffice:

Electricity	**Tenant**	Landscaping	**Landlord**
Gas	**Tenant**	Lawn Mowing	**Landlord**
Water	**Tenant**	Janitorial	**Tenant**
Sewer	**Tenant**	Snow Removal	**Landlord**
Telephone	**Tenant**	Garbage	**Tenant**
Cable	**Tenant**	Internet	**Tenant**

Other: **Landlord agrees to hire a professional company to perform rodent and pest control on a regular basis. Snow removal shall include the secure fenced area for vehicles.**

4.3) Failure to Pay or Provide Services. In the event that Landlord fails to pay utility or service expenses when due, Tenant may elect to pay the vendor to avoid interruption in services. In the event that Landlord fails to provide for services within a reasonable time, Tenant may elect to

complete such services. Any amounts paid by Tenant pursuant to this section shall be set off against any rent owed to Landlord. The foregoing remedy shall be in addition to remedies afforded to Tenant under applicable law. As used herein, "reasonable time" shall mean within a reasonable time after Landlord is informed or has reason to know of the need for completion of the services but shall not exceed 24 hours, absent exigent circumstances.

SECTION 5
MAINTENANCE, REPAIRS AND ALTERATIONS

5.1) Premises. Landlord shall maintain the Premises and keep them in good repair at Landlord's expense. All repairs or replacements shall be made in a manner to minimize the inconvenience to Tenant, visitors and guests and in a manner which maintains the security of the Premises.

5.2) Exterior. Landlord further agrees to maintain and repair the exterior of the Premises, including but not limited to adjacent sidewalks, parking lots, access drives, parking lot striping, building exterior, windows and roof. Landlord shall maintain the exterior of the Premises so that the building shall be properly secure at all times. All maintenance and repair to heating units, air conditioning units, plumbing, gas and electrical systems, sewer systems, and structural repairs, regardless of their location, shall be the obligation of Landlord.

5.3) Interior. Landlord further agrees to maintain and repair the interior of the Premises, including but not limited to the ceilings, ceiling tiles, carpets, floor tile, wall coverings, fluorescent light fixtures and ballasts, electrical system and fixtures, plumbing, heating, ventilation, air conditioning, mechanical equipment, and fire extinguishers.

5.4) Failure to Maintain. In the event that Landlord fails to maintain or repair the Premises within a reasonable time, Tenant may elect to complete the maintenance or repair. Any amounts paid by Tenant for maintenance or repair shall be set off against any rent owed to Landlord. The foregoing remedy shall be in addition to remedies afforded to Tenant under applicable law. As used herein, "reasonable time" shall mean within a reasonable time after Landlord is informed or has reason to know of the need for completion of the services but shall not exceed 24 hours, absent exigent circumstances.

5.5) Alteration. Subject to the prior written consent of Landlord, Tenant shall have the right to make such additions, alterations, changes or improvements to the Premises as Tenant shall deem necessary or desirable.

5.6) Signs. Landlord grants to Tenant the right to construct, place and maintain reasonable signs designating the nature of the business being conducted in said premises including, but not limited to, lettering placed on the glass of said premises. Upon conclusion of the term of this lease or any extension thereof, Tenant will remove all such signs and will restore any damages resulting to the premises by reason of such removal of signs.

5.7) Surrender of Premises. Tenant shall, upon the expiration or earlier termination of this lease or any extension thereof, return possession of the Premises to Landlord in good

order, condition and repair, reasonable wear and tear excepted. Tenant shall leave the Premises and appurtenances thereto free and clear of rubbish and broom clean.

5.8) Destruction of Premises. In the event of a partial destruction of the Premises during the term of this Lease, Landlord shall promptly repair the Premises, provided that appropriate repairs can be completed within forty-five (45) days of the destruction, pursuant to the laws and regulations of applicable governmental entities and authorities that may apply. Any partial destruction of the Premises shall entitle Tenant to a proportionate reduction of rent until the repairs are completed, any proportionate reduction being based upon the extent to which the destruction of the Premises and/or the making of the repairs shall interfere with the business carried on by Tenant on the Premises. Upon receipt of documentation that the repairs cannot be completed in the specified time set forth above, Tenant may immediately terminate the Lease.

A total destruction of the building situated on the Premises shall terminate this Lease, and Tenant shall be obligated to pay rent only to the time of destruction of the building. As used herein, total destruction means that the Premises are destroyed or so damaged as to render the Premises untenantable.

SECTION 6
LANDLORD'S ACCESS TO PREMISES

6.1) Landlord shall have the right, with prior approval of Tenant, to enter the Premises at all reasonable times to inspect them, to make repairs, to maintain the building, and to perform any other work therein which may be necessary.

SECTION 7
REGULATIONS

7.1) Landlord shall comply with all applicable federal, state, and local laws, regulations, and codes, including but not limited to fire and life safety regulations, equal accessibility for the handicapped and disabled specifically conforming to, but not limited to, the Americans with Disabilities Act (ADA), and local and planning ordinances for the City of Rapid City. Landlord or its agent(s) shall be responsible for satisfying the requirements associated with compliance. Any maintenance, repairs or improvements necessary for the premises to meet any applicable regulation, law or code will be performed at Landlord’s expense.

SECTION 8
INSURANCE

8.1) During the term of this lease and any extension thereof, Landlord shall maintain in effect at all times all hazard, standard extended coverage, and fire insurance on the Premises and shall provide proof of such coverage to Tenant. From and after the date of delivery of the

Premises to Tenant, Landlord shall be solely responsible for and shall provide for comprehensive general liability insurance against claims for bodily injury or death and property damage liability insurance on the property in an amount not less than One Million Dollars ($1,000,000) per occurrence.

SECTION 9
INDEMNIFICATION

9.1) Landlord agrees to indemnify and hold harmless the State, its officers, agents and employees, against and from any and all claims by or on behalf of any person arising from any condition of any street, curb, or sidewalk adjoining the Premises, or arising from any breach or default on the part of Landlord, or arising from any act or omission of Landlord or any other occupant of the Premises, or any part thereof, or of its or their agents, contractors, servants, employees or licensees, or arising from any accident, injury or damage whatsoever caused to any person or property occurring during the term of this Lease in or about the Premises, upon or under the sidewalks and the land adjacent thereto, or arising from this Lease, and from and against all judgments, costs, expenses and liabilities incurred in or about any such claim or action.

This section does not require Landlord to be responsible for or defend against claims or damages arising solely from errors or omissions of the State, its officers, agents or employees.

SECTION 10
EVENTS OF DEFAULT; REMEDIES

10.1) Events of Default. Landlord shall be in default if Landlord fails to perform any of the agreements, terms, covenants or conditions hereof on Landlord's part to be performed, and failure continues for a period of thirty days after written notice by Tenant or if default is of such a nature that it cannot be reasonably cured within the thirty day period or Landlord has not in good faith commenced performance within the thirty day period to diligently proceed curing such default.

10.2) Remedies on Default. Upon the expiration of the cure period with respect to any event of default as set forth in Section 10.1 above, Tenant shall have the right to terminate this Lease.

SECTION 11
NOTICE

11.1) All notices or demands under this Lease shall be deemed to have been given when mailed by United States mail, First Class, postage prepaid, to the addresses set out below, or, if personally delivered, when received by such party. Notice of default or termination shall be sent by registered or certified mail or personally delivered.

To Tenant:
State of South Dakota

Pierre, SD 57501

To Landlord:
TBD

Rapid City, SD 57701

To Office of Space Management:
Office of Space Management
South Dakota Bureau of Administration
c/o 500 E. Capitol Avenue
Pierre, SD 57501

SECTION 12
CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY, AND VOLUNTARY EXCLUSION

12.1) Landlord certifies, by signing this Lease, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation, by any Federal department or agency, from transactions involving the use of Federal funds. If Landlord, or any of Landlord's principals, becomes debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in transactions by any Federal department or agency, Landlord will provide immediate written notice in accordance with the method indicated in Section 11 herein. Landlord further agrees that if this Lease involves federal funds or federally mandated compliance, then Landlord is in compliance with all applicable regulations pursuant to Executive Orders 12549 and 12689, 2 CFR part 180, including Debarment and Suspension and Participants' Responsibilities.

SECTION 13
WAIVER

13.1) Failure of any party to insist upon the strict performance of any or all of the terms or conditions of this lease shall not constitute, nor be construed as, a waiver of that party's right to enforce any such terms or conditions, but the same shall continue in full force and effect.

SECTION 14
FUNDING OUT

14.1) Landlord agrees that the continued rental of the premises for the term specified by Tenant is dependent upon receipt of both funds and expenditure authority from the Legislature. In the event that the Legislature does not provide funds or expenditure authority, then and in such event, this lease is null and void and said lease shall expire at the end of the fiscal year in which the last funding shall be made available for Tenant. Landlord agrees that a termination

because of lack of funds or expenditure authority will not result in a claim against Tenant, the State of South Dakota, or any officer or employee of the State, and waives any claim against the same.

SECTION 15
CANCELLATION

15.1) After the tenth anniversary of the Lease the Tenant or Landlord may cancel this lease upon **one year** advanced notice in writing. The parties agree that this Agreement may be cancelled anytime pursuant to the provisions of Sections 5.8, 10, and 14 of the Lease, or if the property is sold to a new owner or Landlord. The notice required shall not release either Landlord or Tenant from full performance of all terms and conditions of this lease during the continuing occupancy of Tenant after the notice of termination but before Tenant vacates the premises.

SECTION 16
GENERAL PROVISIONS

16.1) Successors and Assigns. This Lease shall bind and inure to the benefit of the parties hereto and their successors and assigns.

16.2) Construction. The language in all parts of this Lease shall be in all cases construed according to its plain meaning and not strictly for or against Landlord or Tenant.

16.3) Severability. If any term, covenant, condition or provision of this Lease is held by a Court of competent jurisdiction to be invalid, void or unreasonable, the remainder of the provisions hereof shall remain in full force and effect and shall in no way be affected, impaired or invalidated thereby.

16.4) Law Governing. This Lease shall be governed by, construed, and enforced in accordance with the laws of the State of South Dakota. Any lawsuit pertaining to or affecting this Agreement shall be venued in Circuit Court, Sixth Judicial Circuit, Hughes County, South Dakota.

16.5) Entire Agreement. This Lease, together with any written modifications, addendums or amendments, hereinafter entered into, shall constitute the entire agreement between the parties and shall supersede any prior agreements or understandings, if any, whether written or oral, which the parties may have had relating to the subject matter.

16.6) Prior Lease. This lease shall render null and void any previous lease or agreements between Tenant and Landlord for the Premises.

16.7) Counterparts. This Lease may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

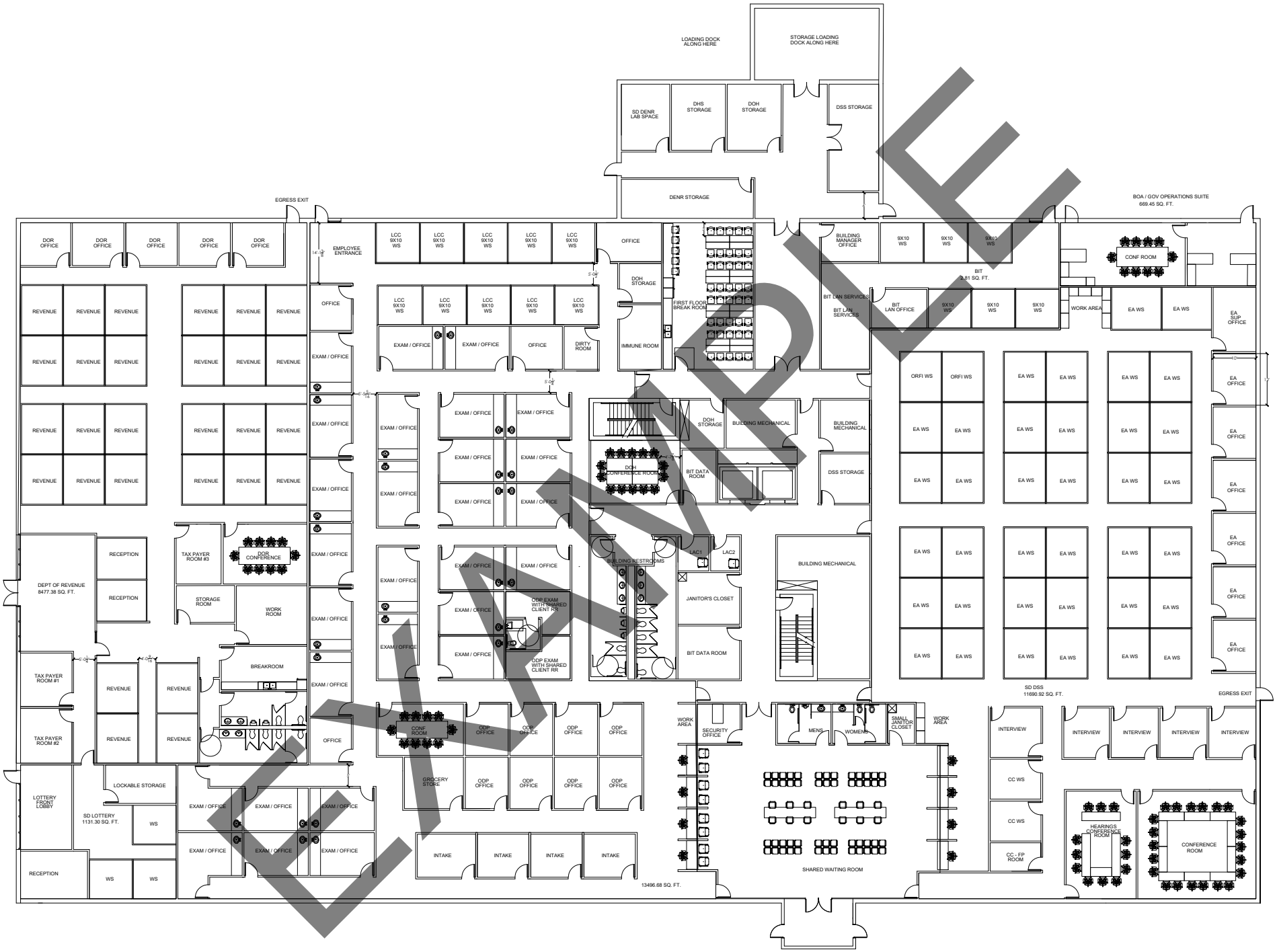
16.8) Modifications. Any modification of this Lease, or additional obligation assumed by either party in connection with this Lease shall be binding only if evidenced in writing and signed by each of the parties. The parties warrant that they have the full right and authority to enter into this Lease and hereto have executed this Lease as of the day and year first above written.

STATE OF SOUTH DAKOTA **Department of**	Landlord **TBD XYZ Company**
Signature _____	Signature _____
, Secretary Department of	XYZ Company
Date _____	Date _____
APPROVED	
Signature _____	
Scott W. Bollinger, Commissioner Bureau of Administration	
Date _____	

EXHIBIT B

PRELIMINARY PLANS

TABLE OF CONTENTS



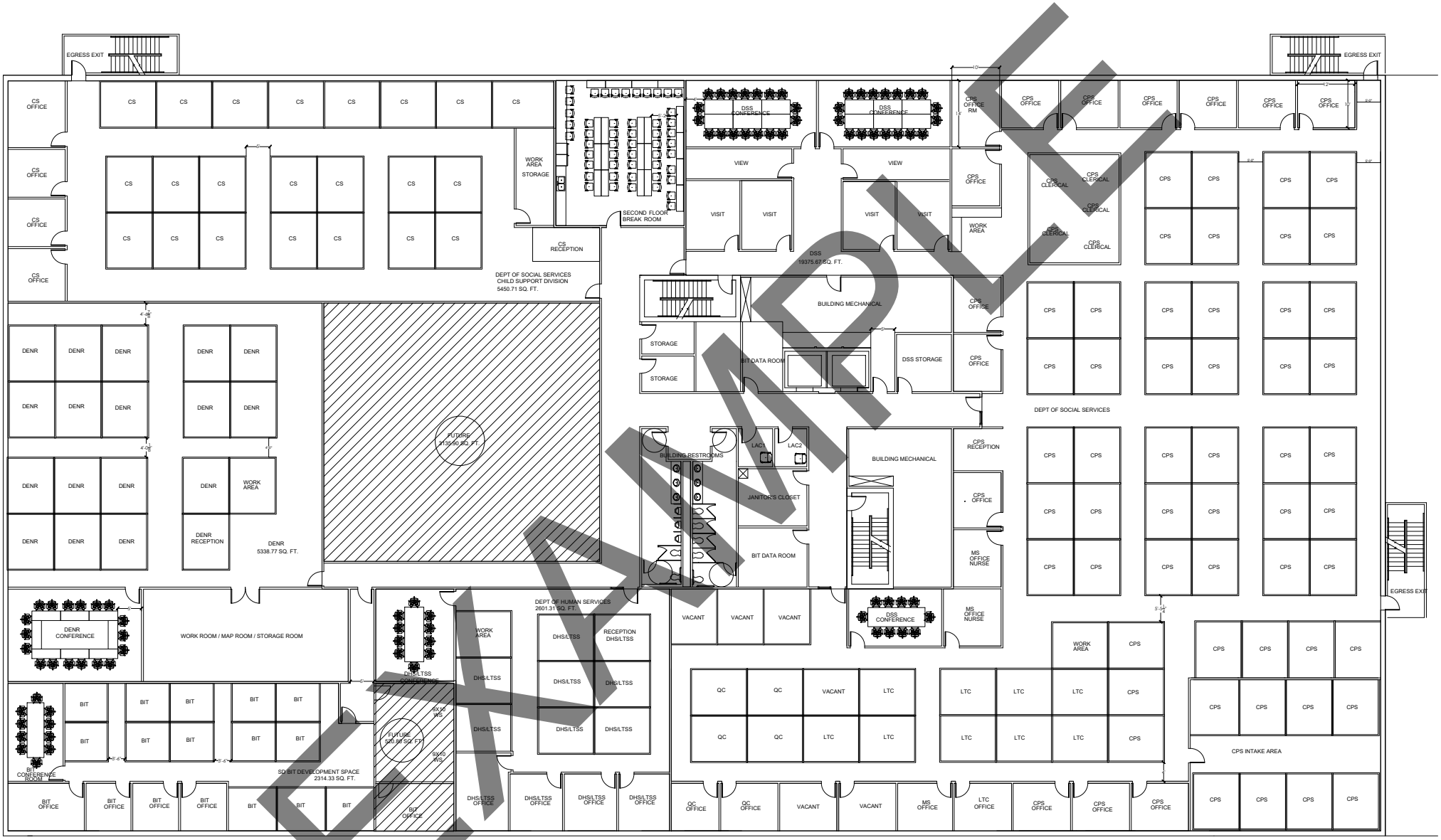
DG DESIGN STUDIO
Space Planning+Design

STATE OF SOUTH DAKOTA- BUREAU OF ADMINISTRATION

1ST. FLOOR | SCALE: NTS

CONCEPTUAL LAYOUT | DRAWN BY: DG | DATE: 03.13.20

A2.1



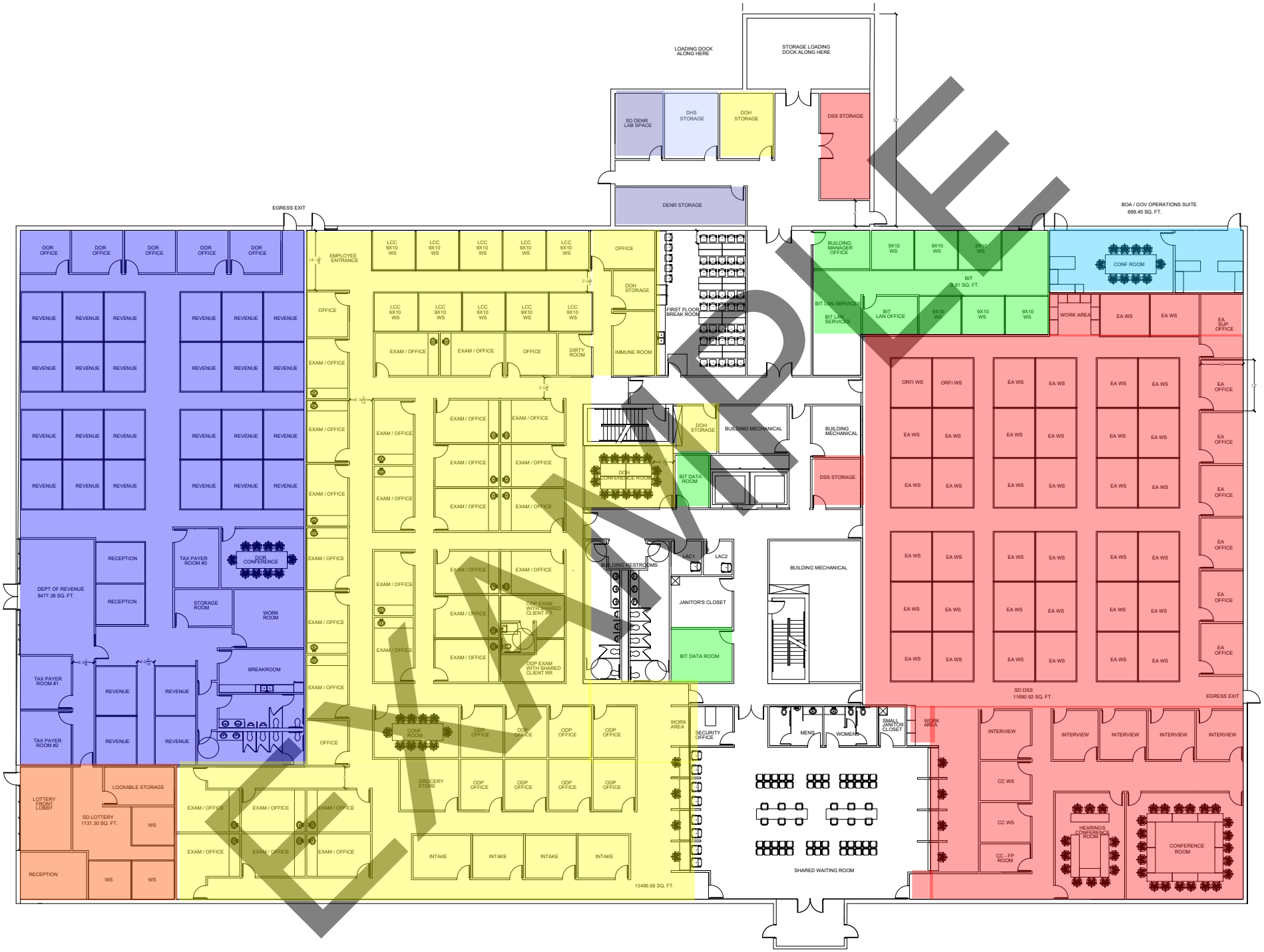
DG DESIGN STUDIO
Space Planning+Design

STATE OF SOUTH DAKOTA- BUREAU OF ADMINISTRATION

2ND. FLOOR | SCALE: NTS

CONCEPTUAL LAYOUT | DRAWN BY: DG | DATE: 03.13.20

A2.2



DG DESIGN STUDIO
Space Planning+Design

STATE OF SOUTH DAKOTA- BUREAU OF ADMINISTRATION

1ST. FLOOR

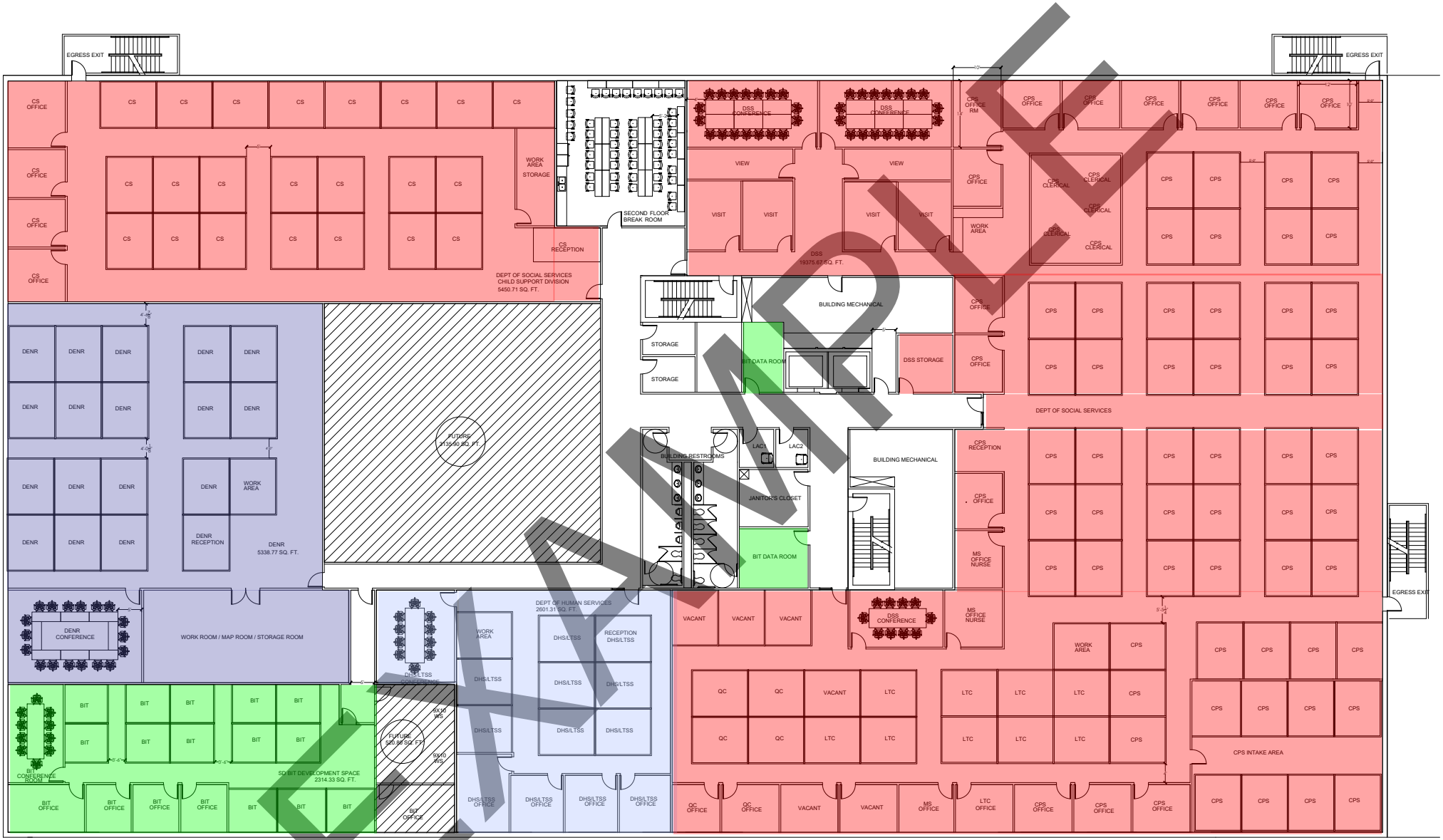
CONCEPTUAL LAYOUT- BY AGENCY CODED

SCALE: NTS

DRAWN BY: DG

DATE: 03.13.20

A2.3



DG DESIGN STUDIO
Space Planning+Design

STATE OF SOUTH DAKOTA- BUREAU OF ADMINISTRATION

2ND. FLOOR

SCALE: NTS

CONCEPTUAL LAYOUT- BY AGENCY CODED

DRAWN BY: DG

DATE: 03.13.20

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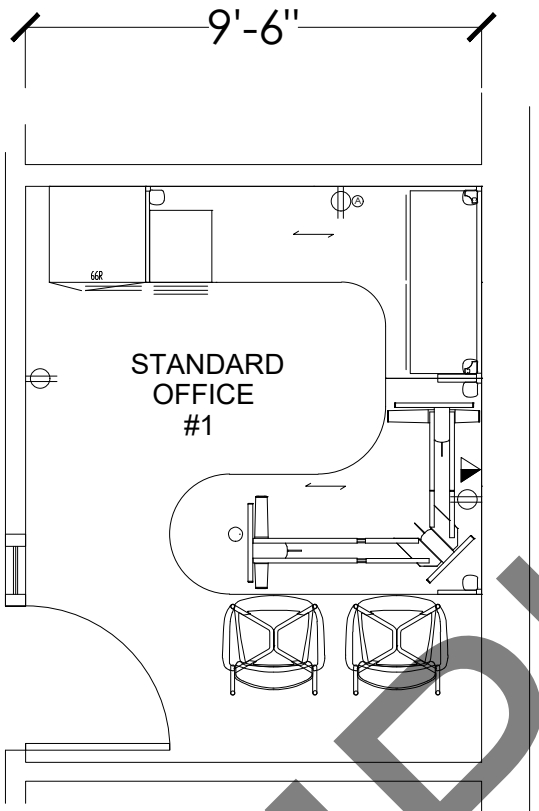
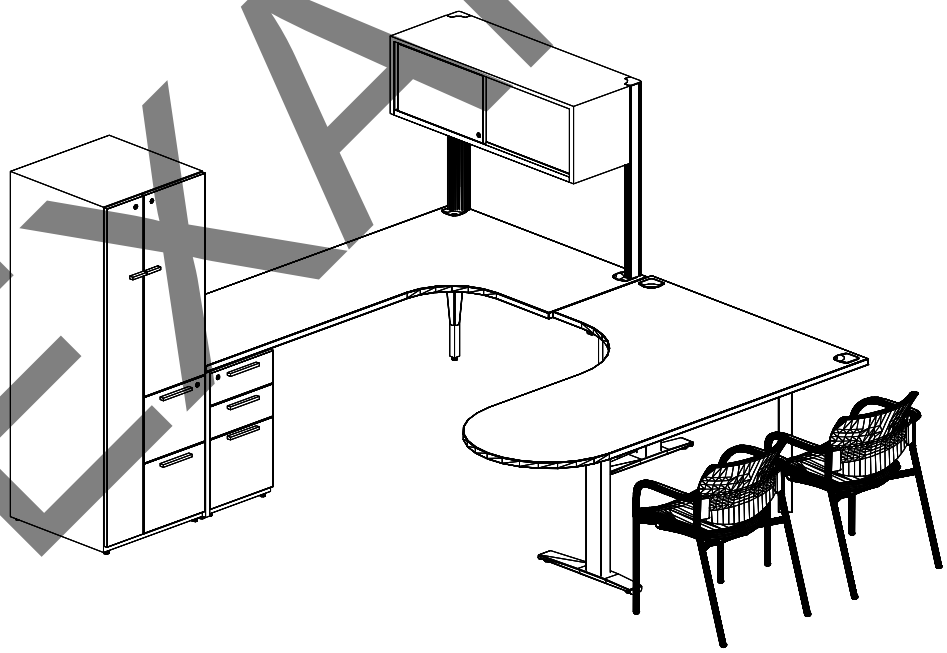




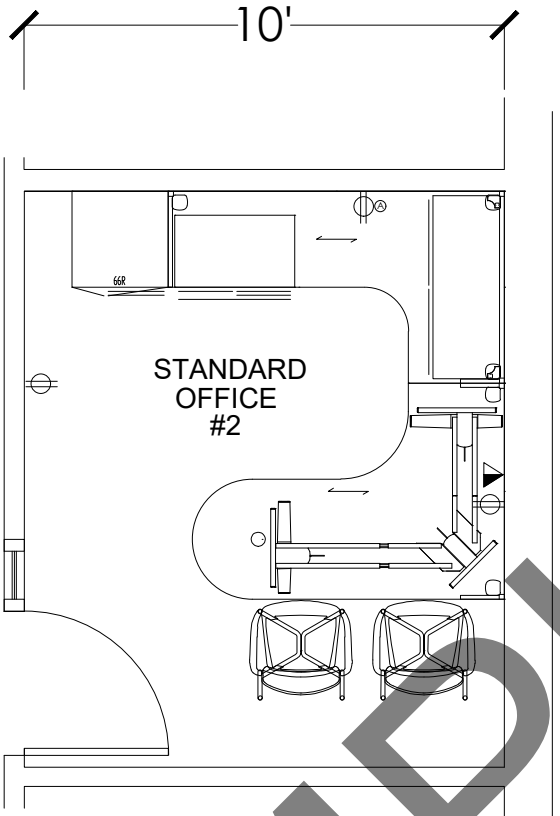
DG DESIGN STUDIO
Space Planning+Design

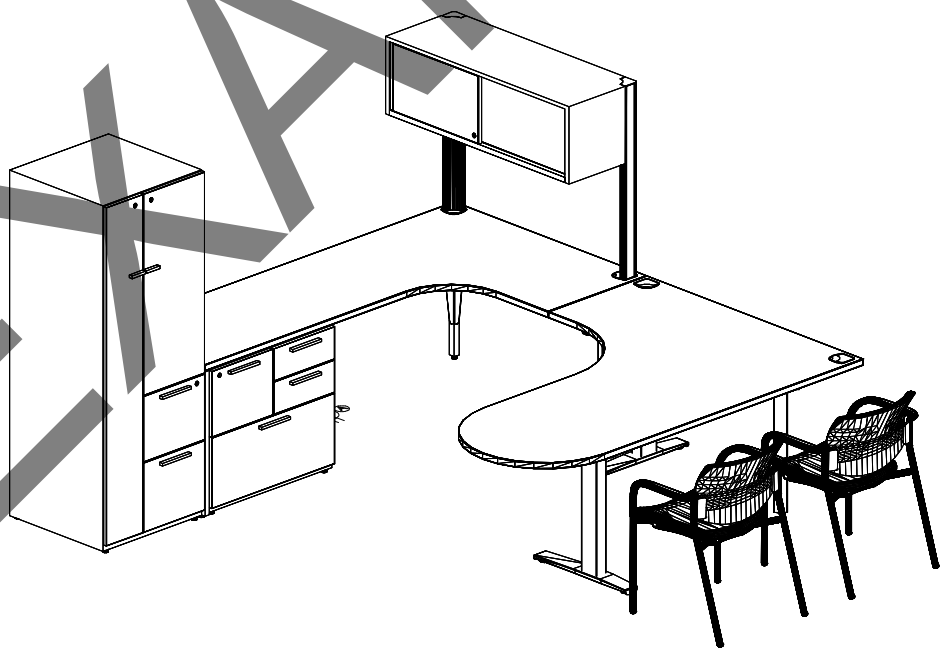
STATE OF SOUTH DAKOTA- BUREAU OF ADMINISTRATION

STANDARD 9' x 12' OFFICE | SCALE: $\frac{1}{4}$"= 1'

CONCEPTUAL LAYOUT | DRAWN BY: DG | DATE: 03.13.20

A2.5.a





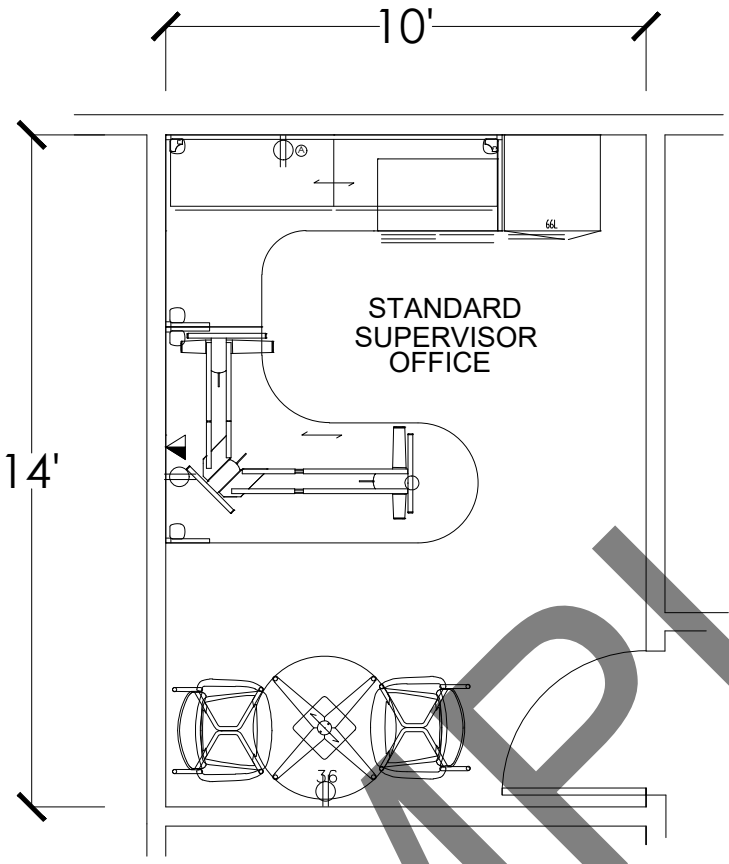
DG DESIGN STUDIO
Space Planning+Design

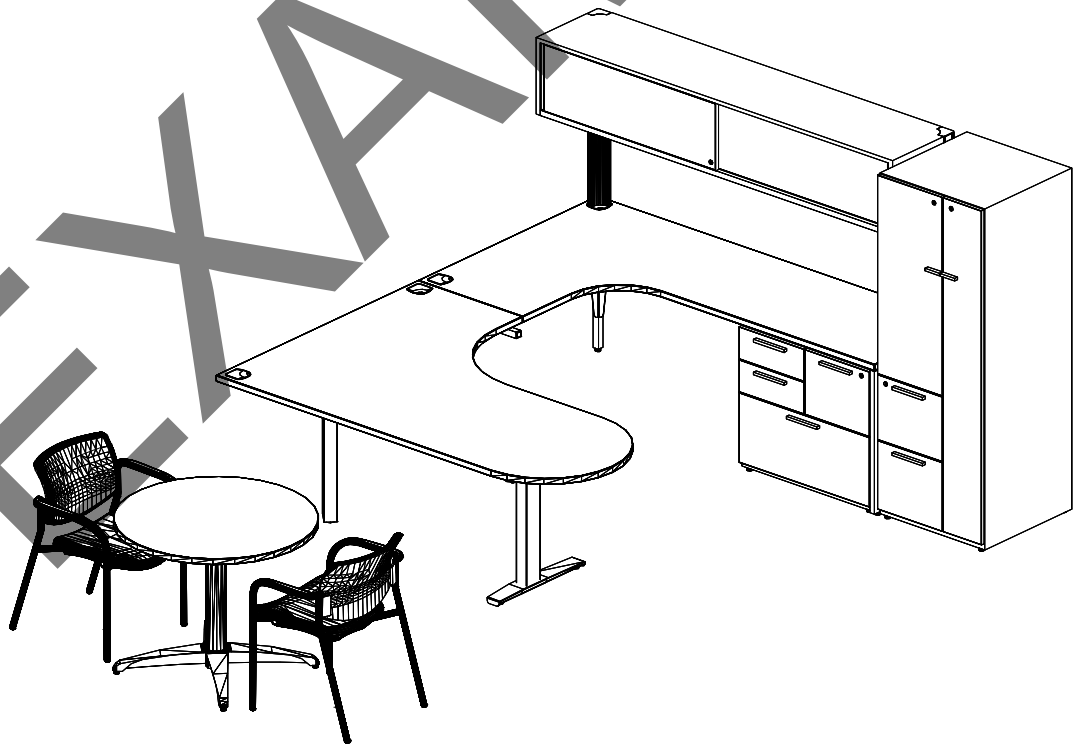
STATE OF SOUTH DAKOTA- BUREAU OF ADMINISTRATION

STANDARD 10' x 12' OFFICE — SCALE: $\frac{1}{4}$"= 1'

CONCEPTUAL LAYOUT — DRAWN BY: DG — DATE: 03.13.20

A2.5.b





DG DESIGN STUDIO
Space Planning+Design

STATE OF SOUTH DAKOTA- BUREAU OF ADMINISTRATION

STANDARD 10' x14' MGR. OFFICE	SCALE: $\frac{1}{4}$"= 1'	A2.5.c
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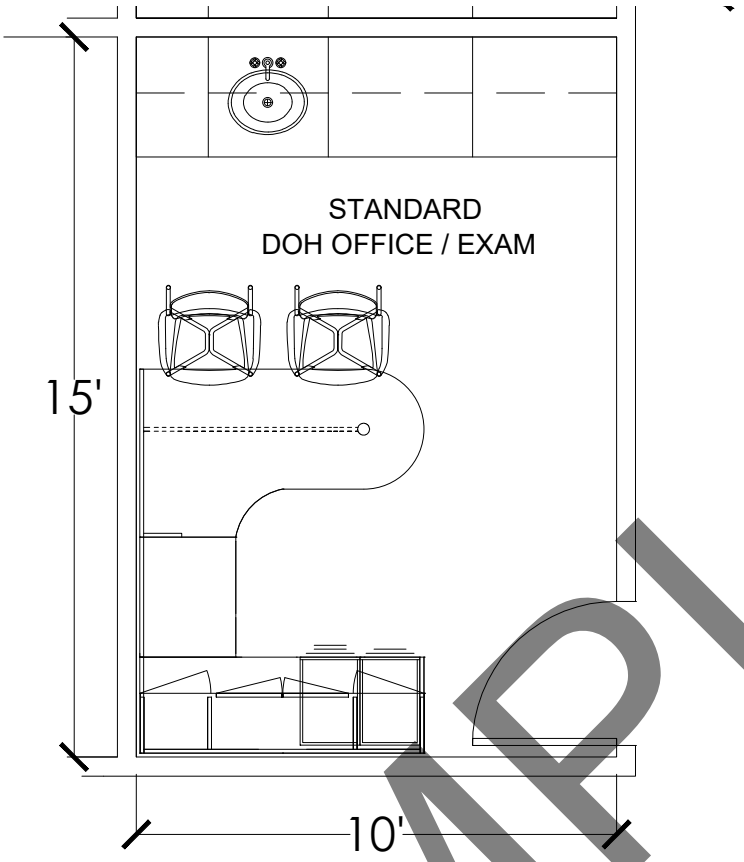
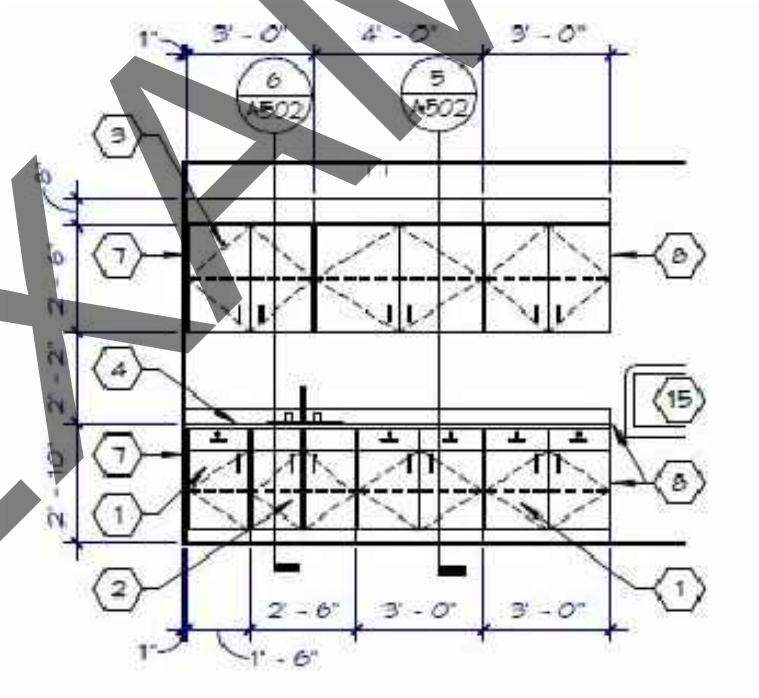
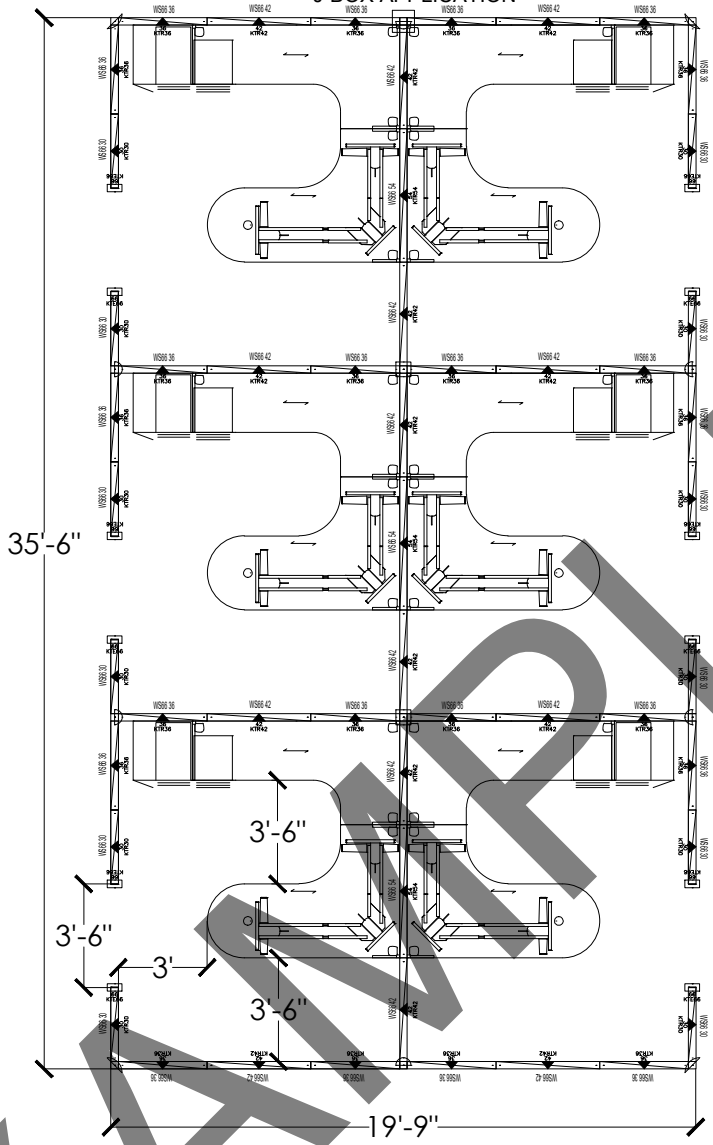
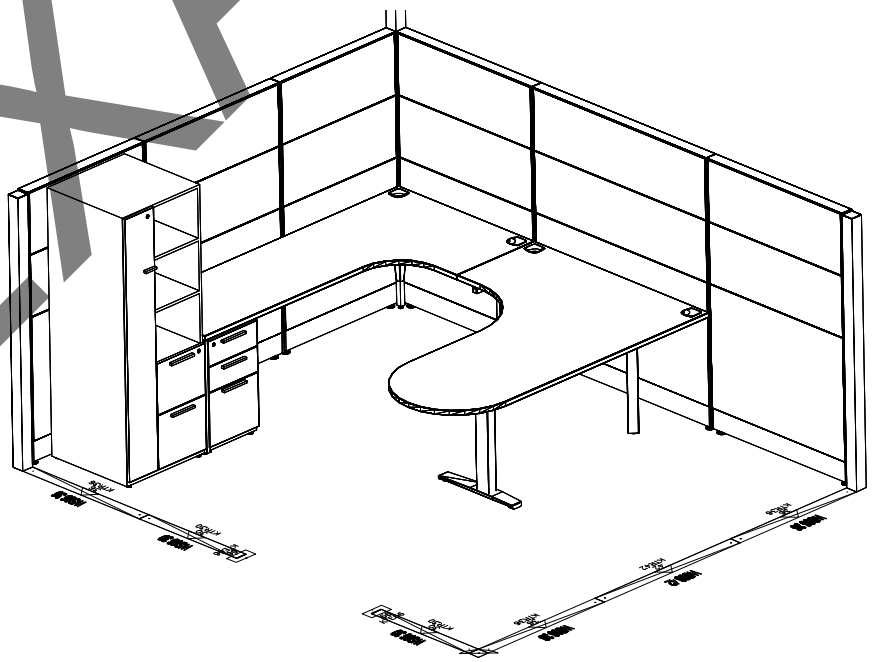

STANDARD
DOH OFFICE / EXAM
15'
10'


3' - 0"
4' - 0"
3' - 0"
6
A502
5
A502
3
7
8
4
15
7
8
1
2
1
2' - 6"
3' - 0"
3' - 0"
1' - 6"

CEILING FEED
J-BOX APPLICATION





DG DESIGN STUDIO
Space Planning+Design

STATE OF SOUTH DAKOTA- BUREAU OF ADMINISTRATION

A2.5- STANDARD 9'-6" x 11'-6" WORKSTATION TYPICAL — SCALE: $\frac{1}{4}$"= 1'

CONCEPTUAL LAYOUT — DRAWN BY: DG — DATE: 03.13.20

A2.5.e

EXHIBIT C

BUILDING STANDARDS

STATE OF SOUTH DAKOTA
BUREAU OF ADMINISTRATION

Rapid City, South Dakota
General Building Standards
March 2020

TABLE OF CONTENTS

STATE OF SOUTH DAKOTA
BUREAU OF ADMINSTRATION
PIERRE, SOUTH DAKOTA

GENERAL SPECIFICATIONS FOR NEW CONSTRUCTION OR RENOVATION OF EXSITING BUILDING CONSTRUCTION FOR A PROPOSED, COMPREHENSIVE AGENCY COMBINED SPACE FOR THE STATE OF SOUTH DAKOTA IN RAPID CITY.

PROJECT BACKGROUND

The Bureau of Administration representing the State of South Dakota has developed the attached conceptual building plan. This document contains interior block space plan which includes space for Department of Social Services, Department of Health, Department of Revenue, Department of Human Services, Bureau of Administration, Bureau of Information and Telecommunications, and Department of Environment and Natural Resources, all State Agencies located in Rapid City and being proposed into a single conceptual space.

Included in this document are the general standards associated for the building construction and interior build out of their new facility. Note this document is a standard used by the State of South Dakota for typical State Agency field office locations. These requirements have been formalized and are listed within. Specific site and architectural parameters, zoning and code requirements along with agency requirements shall serve as the minimum standards for this building construction.

Note: This document is for reference only and is based on new construction for previous field offices across South Dakota which have ranged from 4000 sq. ft. to 14000 sq. ft.

References to Owner, Offeror or Developer mean the same for this RFP.

GENERAL REQUIREMENTS

1. The owner shall comply with all applicable local and national codes, fire and life safety regulations, and equal accessibility for the handicapped and disabled specifically conforming to but not limited only to the Americans with Disabilities Act (ADA) of 1990 and as amended in 2010 and local zoning and planning ordinances for the City of Rapid City South Dakota. The owner or its agent shall be responsible for satisfying the requirements associated in the construction and build out for the facility and site development. The owner will be responsible for acquiring construction permits applicable. And inclusive of all related subsequent inspections leading to occupancy by the State.

2. The owner shall incorporate the Agency's entire program and space requirements as listed within, meet as a minimum the performance standards identified within these specifications regarding the design of the facility and development of the site.

3. The owner is fully responsible for all site development and construction of the facility. The sequencing of work, scheduling and coordination of the contractors and securing of bids is the responsibility of the owner/developer.

4. Owner shall be responsible for all architectural, engineering, and or professional services applicable.

SITE

1. Parking

A. Provide parking for vehicles on site for employee and visitors. Secured Parking to be provided for 100 State Vehicles. All stalls to be defined with yellow stripes. Parking shall meet all ADA requirements and restrictions. ***Note More information detailed in the State RFP (3.3 Project Details, B-Dimensions).**

B. Access through the parking areas and pedestrian areas shall be barrier free and comply with handicap access requirements. The developer shall provide required handicap stalls, stall markings and required signage.

C. Parking areas shall be designed to provide proper drainage by use of curbs, gutters, drains and sloped surfaces. Parking areas shall not drain onto adjoining properties.

D. Provide concrete walks from all entrances to parking areas public sidewalks.

E. The developer shall be responsible for the coordination of the location of utility lines and/or easements that cross through the site with the respective utilities.

F. Parking lots will maintain one-foot candle illumination at 3' throughout. LED Fixtures shall be operated with a photocell or photo eye dusk to dawn for auto lighting.

2. Site Work

A. If the site is adjacent to a flood plain, the elevation of the lowest floor shall be noted on the site plan along with the elevation and location of the 50-year and 100-year flood plain. The first floor shall be 2' above the 100-year flood plain.

B. The building floor elevation shall be set to provide positive drainage away from the building.

3. Miscellaneous Items

A. Provide additional fences or screens as called for (dumpsters, etc.). Exact specifications for location and type

of fences shall be reviewed with tenant prior for approval and before proceeding with construction.

B. Exact specifications for location and type of signage shall be reviewed with tenant prior to proceeding. State will provide sign(s). Responsibility of owner/builder to install as per State standard.

BUILDING CONSTRUCTION

1. Exterior Facade

A. Exterior walls, load bearing or non-load bearing may be constructed from the following:

1. Brick veneer on wood or metal studs.
2. Brick with masonry backup.
3. Split faced concrete masonry units.

2. Interior Finishes

A. Interior face of exterior wall shall be finished with 5/8” drywall taped and finished.

3. Roof Systems

A. Structural roof system may be constructed from the following**:**

1. Pre-fabrication wood truss system
2. Steel truss system
3. Wood framing

B. Provide warranty information with proposed roof system to state for review.

C. Roof system/ ceiling cavity shall be insulated to provide an R-40.

4. Interior Partition Systems

A. Interior partitions shall be constructed from a minimum stud sized of a 2x4 nominal sized wood stud or a 3 5/8”, 26-gauge metal stud at maximum stud spacing of 16” on center. **All interior walls will be insulated and/ or soundproofed with foam or insulation**.

B. Interior partitions shall have 5/8” gypsum board fastened to the stud system described in item 5-A above. Contractor shall utilize fire rated gypsum board where required (e.g. Corridors, mechanical rooms and walls adjacent to areas susceptible to moisture (e.g. janitor sink).

C. Knee walls shall have 5/8” gypsum board fastened to stud system as described in item 5-A above.

D. Provide ½" plywood backing under gypsum board at all walls in all public restrooms and BIT Computer Rooms.

E. Provide wood blocking within all walls that show furniture cabinets, shelving or countertops as needed. Specifically, DOH Exam Offices.

5. Millwork

A. Provide Merrillat Avia Series or equal base and upper cabinets in all Breakrooms, and Exam Rooms to include sink. Provide base cabinet in Conference Rooms where required by agencies area. Provide plastic laminate countertop w/ min. 4" backsplash. Tenant to approve non-specified laminate colors.

B. Janitors Rooms - Provide Merrillat Avia Series or equal base cabinet. Provide plastic laminate countertop with 18" backsplash on back wall and adjacent walls of cabinet.

C. Specified Storage Rooms 24" deep built-in commercial rated shelving.

D. Specified Laminate for base and upper cabinets is Wilson Art Skyline Walnut #7964. Specified Countertop laminate is Wilson Art Portico #8210. Or Equal manufacture to colorway.

6. Door, Door Frames and Hardware

A. Interior Office Doors- All interior doors shall be commercial grade stain grade plain sliced oak veneer with hardwood edges set into a welded hollow metal frame. Door construction shall be solid core and measure 3'- "wide by 7'0" tall. Office doors shall be equipped with an office function lockset. Conference rooms, closets and restrooms shall be equipped with a latch set. Restrooms shall be equipped with a storeroom function lockset and overhead closer. Specified Doors shall be equipped with a closer. All locksets and latch sets shall be lever style to comply with ADA requirements. All office doors shall have a coat hook mounted to the interior side of the door. Provide silencers and door stop knob wall bumps.

B. All Exterior Doors #and Entrance exterior doors (inner and outer vestibule at front entry) shall be commercial grade storefront doors. Doors shall be equipped with a dead bolt with interior lever release mounted at 38" AFF and an overhead closer.

C. Specified exterior and interior doors will require electronic card readers throughout the building. Approximate required is 40.

D. Glass Doors will be specified in areas where required.

7. Windows and Glazing

A. All exterior windows shall be anodized extruded aluminum as manufactured by Kawneer or equal. All laminated glazing shall be fixed and shall be insulated with the low "E" option.

B. Developer shall provide all window coverings, to be specified with tenant as to style and color. See window schedule for sizes (not formulated at this time).

8. Ceiling Systems

A. A suspended ceiling system shall be installed in all office areas, conference, workrooms and file rooms. Vestibule shall be finished in smooth drywall. Mechanical rooms are to have exposed drywall ceilings. Provide fire rated ceilings as required by code.

B. Ceiling Heights- All enclosed office areas, open office space, and common areas shall have a minimum 10'-0" ceiling height. All restrooms minimum of 9'-0".

C. Suspended system- Provide a "DX" type grid in 2' x 2' OR 2' x 4'.

9. Flooring

A. **Ceramic, Quarry Tile**

1. Vestibules: Quarry Tile 6" by 6", Crossville ceramics or equal, slip resistant finish, color selected by tenant.
2. All Restrooms & All waiting room areas Ceramic Tile placed on floors and coved onto wall and toilet wall from corner to corner to 48" AFF, 4" by 4" American Olean or equal; color selected by tenant from price groups 1 and 2.
3. All areas receiving ceramic tile shall be finished in ceramic cove to match.

B. **Vinyl**

1. See attached LVT Standard.
2. Vinyl Base specified is Shaw Vinyl floor base shall be installed in all carpeted and vinyl areas including all hallways as well as in the Mechanical Rooms Janitor's Rooms. Base shall be 4" base as manufactured by Shaw #148VS Collection Accessories Color Night 00066 or equal.
3. Vinyl shall be installed in all areas specified storage areas, lab space, lactation, BIT Rooms, breakrooms, all common corridors in center core areas and as specified with tenants.

C. **Carpeting**

1. Carpet shall be installed in all areas unless otherwise noted.
2. See attached Carpet Standard.
3. Double walk off mat shall be installed in front of vestibules. Carpet insert shall be 100% nylon fiber face with ¼" finished pile height, 32 ounce, fusion bonded and locked into aluminum tread rails. Provide extruded aluminum perimeter frame. Mat and frame shall be recess mounted flush with quarry tile. Tenant to approve color.

D. **Exposed Concrete**

1. Mechanical Rooms Janitor's Rooms and Loading Dock area shall have exposed concrete as finished floor. Provide concrete sealer at all exposed concrete floors.

10. <u>Wall Finishes</u>

A. All exposed wall surfaces shall receive texture on drywall and paint, unless otherwise noted by ceramic tile.

B. Restrooms shall receive texture on drywall, and paint, above ceramic tile wainscot.

C. All areas to be painted shall receive two coats of a premium grade latex semi gloss enamel equal to Sherwin William.

D. See attached Paint Color Standard.

E. Tenant(s) will have final approval on all finishes to the building spaces.

11. Restroom Accessories

A. Restroom accessories shall be Bobrick or equal. All accessories shall be mounted in accordance to ADA standards. Accessories are as follows or equal:

1. SOAP DISPENSERS: Model B-111, one per sink.
2. WASTE DISPOSAL/DISPENSER: Model B-3944, one per restroom.
3. HANDICAPPED GRAB BARS: Model B-6106 Series.
4. TOILET PAPER HOLDERS: Model B-274, one pre stall.
5. ROBE HOOKS: Model B-670, one pre stall.
6. SANITARY NAPKIN DISPOSAL: Model B-270, one per stall in Women's Restrooms.
7. Provide folding baby care change tables in Restroom #115.
8. Provide ¼" thick acrylic framed minimum 2'x3' mirrors in all Restrooms.

B. Provide ADA accessible sink cabinets.

12. Stall Partitions

A. Toilet partitions and urinal screens shall be the following:

1. TYPE FF, Full Flush by American Sanitary Partition Corporation or equal. Baked enamel color to be selected by tenant.
2. URINAL SCREENS: Type one- Wall hung, by American Sanitary Partition Corporation or equal.

13. Miscellaneous Items

A. Provide fire extinguishers in recessed cabinets as per code.

B. Provide one 3' x 5' one-way viewing mirror in area between Viewing Rooms and Visitation rooms. Provide black-out curtains or dark shades to be installed on Viewing room side.

ELECTRICAL

1. Exterior Requirements

A. Provide 10 high pressure sodium Lithonia LED floodlights or equal with a Vandal guard on each light. Locate three spaced equally along both the front and rear, and two on each side mounted at the corners of the building. Provide photocell and contactor to operate the lights.

2. Lighting Requirements

A. Developer shall provide a minimum level of light at the following levels:

1. Open office areas, enclosed offices, conference room 75 fc at 30" AFF.
2. Restrooms, and file rooms. 60fc at 30" AFF.
3. Mechanical rooms, corridors and vestibules 35fc at 30" AFF.

B. All rooms, except as noted below, shall have a minimum of (2) 2'x 4' recessed LED troffer by Lithonia or equal with flat steel frame and 0.125" acrylic lens.

C. Provide exit and emergency lights with battery backup as required by code.

D. Provide occupancy sensors in all rooms.

3. Power Requirements

A. The developer shall provide electrical receptacles per the following formula:

1. **3 standard duplex receptacles in each room or office** on a minimum basis but to include one additional duplex receptacle per every 100 square feet in excess of 100 square foot standard room size.
2. **1 standard data/phone receptacles in each office**. Receptacle shall be constructed of a 4" by 4" box with ¾" conduit stubbed up into the ceiling plenum with pull string. **Cabling and finish work to be provided by Offeror per the BIT Wiring Spec (see attached).**
3. Provide single duplex receptacle outlets in waiting rooms as per code. Coordinate location for copier machine with tenant.

4. Provide 3 standard duplex outlets, 3 separate circuits, in BIT Rooms. See Electrical plans for all locations (not formulated at this time). Electrical contractor will be responsible for all local code applications.

4. Door Security Specifications

A. Follow BIT requirements for all door security. Requirements include the following:

1. Amag Software and Hardware
2. HID Door Hardware

MECHANICAL

1. General Requirements

A. A complete automatic temperature control system shall be provided.

2. Zones and Controls

A. Provide reversible, variable speed ceiling fan in Breakroom and conference Room. Tenant to approve selection.

B. Exhaust systems shall be provided with auto sensors in connection with the lighting in specified areas. Exhaust systems shall also be in specified specific areas.

C. D-Mark Room must have individual room temperature control capabilities.

3. Plumbing

A. Heaters shall be size based on fixture count and 110 degrees F water temperature. Water heaters shall be State, A.O. Smith or Rheem. Provide a small under counter water heater in Break Rooms.

B. Restrooms Fixtures shall be the following or equal to:

1. Toilet: American Standard, Afwall elongated 1.5 gpf mounted toilets.
2. Urinal: American Standard, Jetbrook.
3. Lavatory: American Standard, Aqualyn self rimming. Total fixture count = 4.

C. Provide slop sink (1 total) in all janitor's rooms.

D. Provide one (1) Halsey Taylor BFC-8F or equal water coolers in all Waiting rooms.

E. Provide specified minimums for drinking fountains and water bottle fillers in corridor for building. See ADA to comply with plan for locations.

4. Automatic Sprinkler, Fire Protection System

A. Install, if required by Federal, State, or City Code (Building Official) or at the option of the Landlord.

CARPET STANDARD

broadloom

VIEW

DESIGN IS PERCEPTION

shaw contract group

quick ship

FORM A NEW POINT OF VIEW

Positive and negative spaces take organic shape. Bold, energetic lines form optical texture in tile and broadloom.

shown in modify


sight 03111


drift 03170


area 03761


flip 03335


range 03755

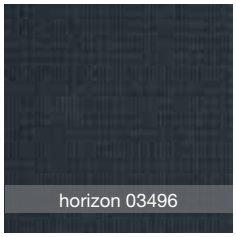

zone 03505


gaze 03530


outlook 03557


distance 03597


vista 03481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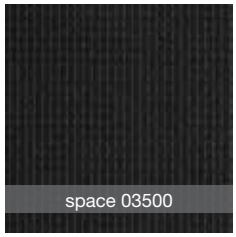

space 03500

EYEING A TIGHT SCHEDULE?

quick ship

Looks like you're in luck. Place your order for up to 2,500 yards of tile, and upon confirmation, we'll ship to your door in two weeks or less. Now that's what we call a design rush. To see other quick ship designs visit shawcontractgroup.com.

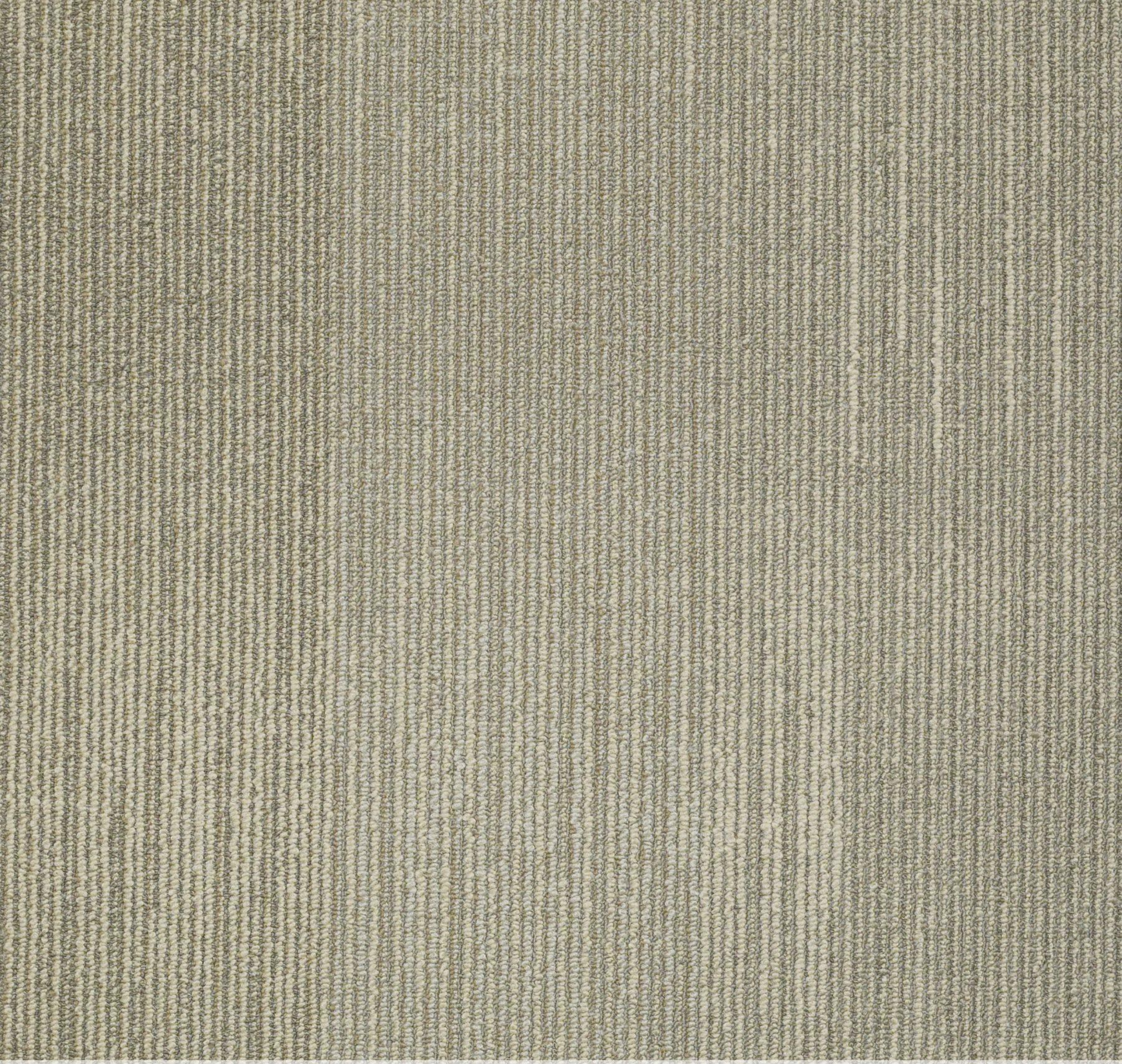
product specifications

	Broadloom
Face weight:	switch: 20 oz transfer: 20 oz modify: 20 oz
Fiber:	Eco Solution Q®
Backing:	Classicbac

cradle to cradle SILVER

shaw contract group®

For more information on **View** contact your local Shaw Contract Group representative, visit us at www.shawcontractgroup.com or call 877-502-SHAW.

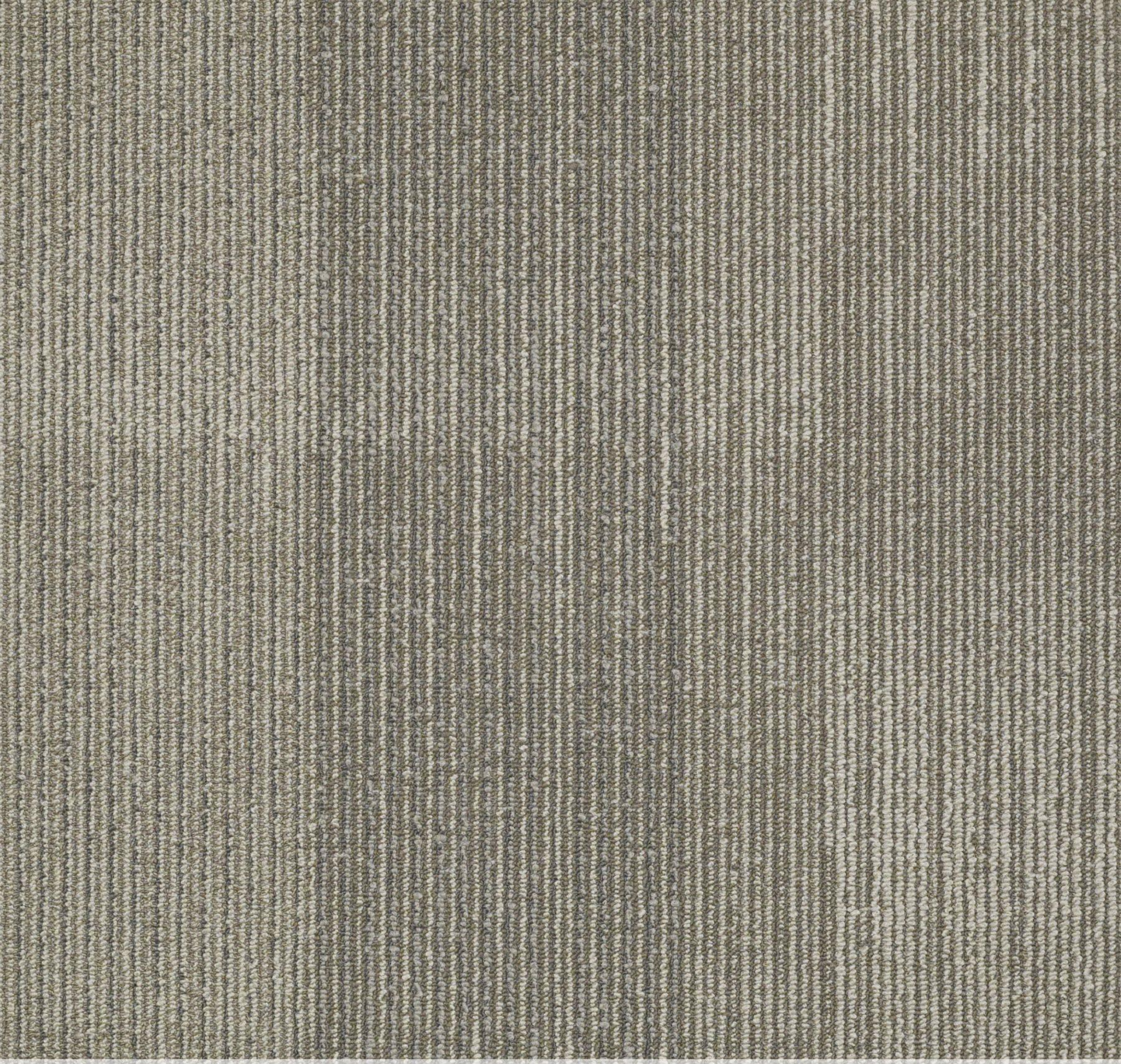


Style: 5T069 reverse tile | Color: 69111 sight

The product rendered in this room scene may not be an exact representation of actual flooring.
Style: 5T069 reverse tile | Color: 69111 sight | Install Method: quarter turn

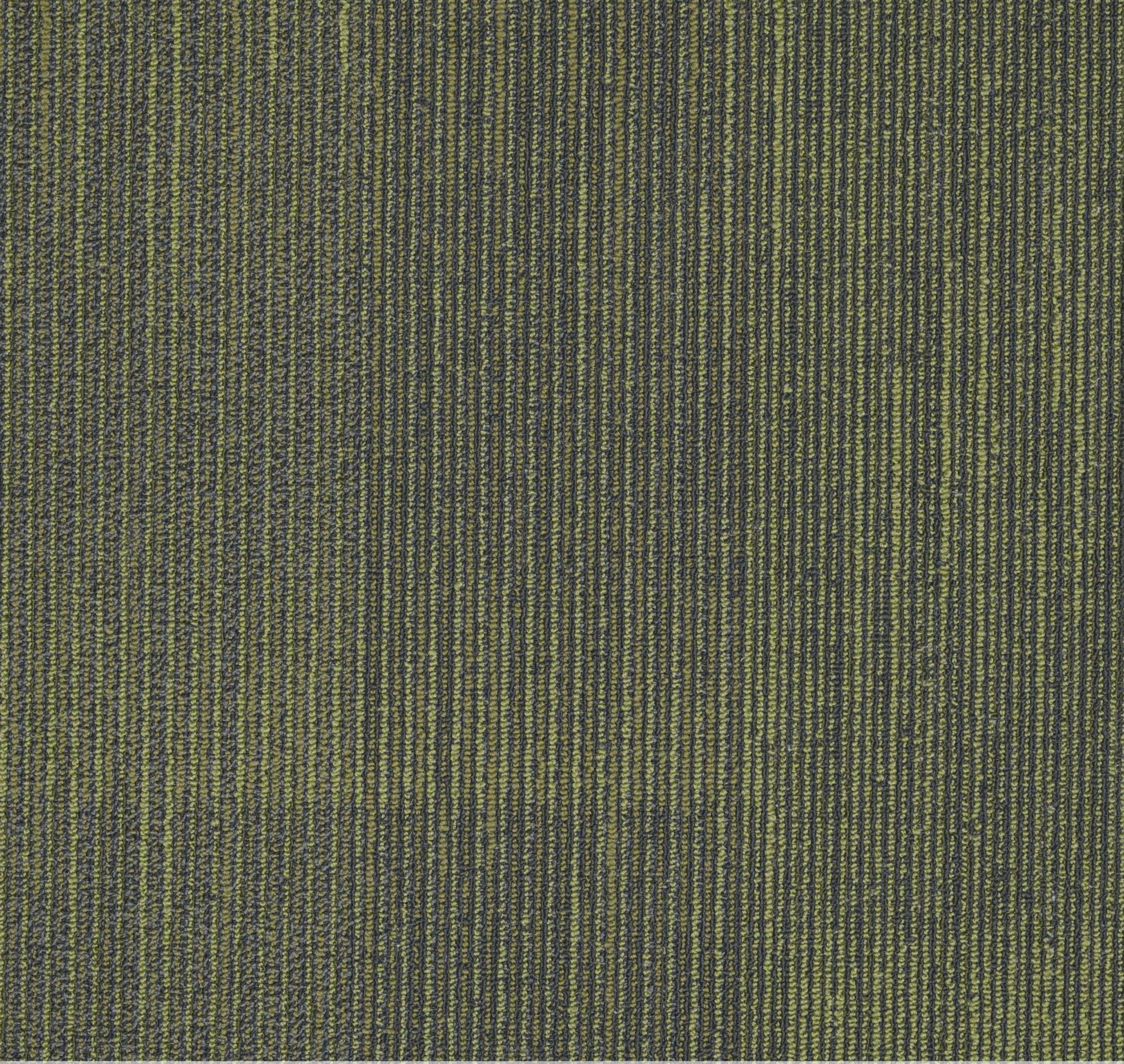
Style: 5T069 reverse tile | Color: 69170 drift

The product rendered in this room scene may not be an exact representation of actual flooring.
Style: 5T069 reverse tile | Color: 69170 drift | Install Method: quarter turn



Style: 5T069 reverse tile | Color: 69761 area

The product rendered in this room scene may not be an exact representation of actual flooring.
Style: 5T069 reverse tile | Color: 69761 area | Install Method: quarter turn

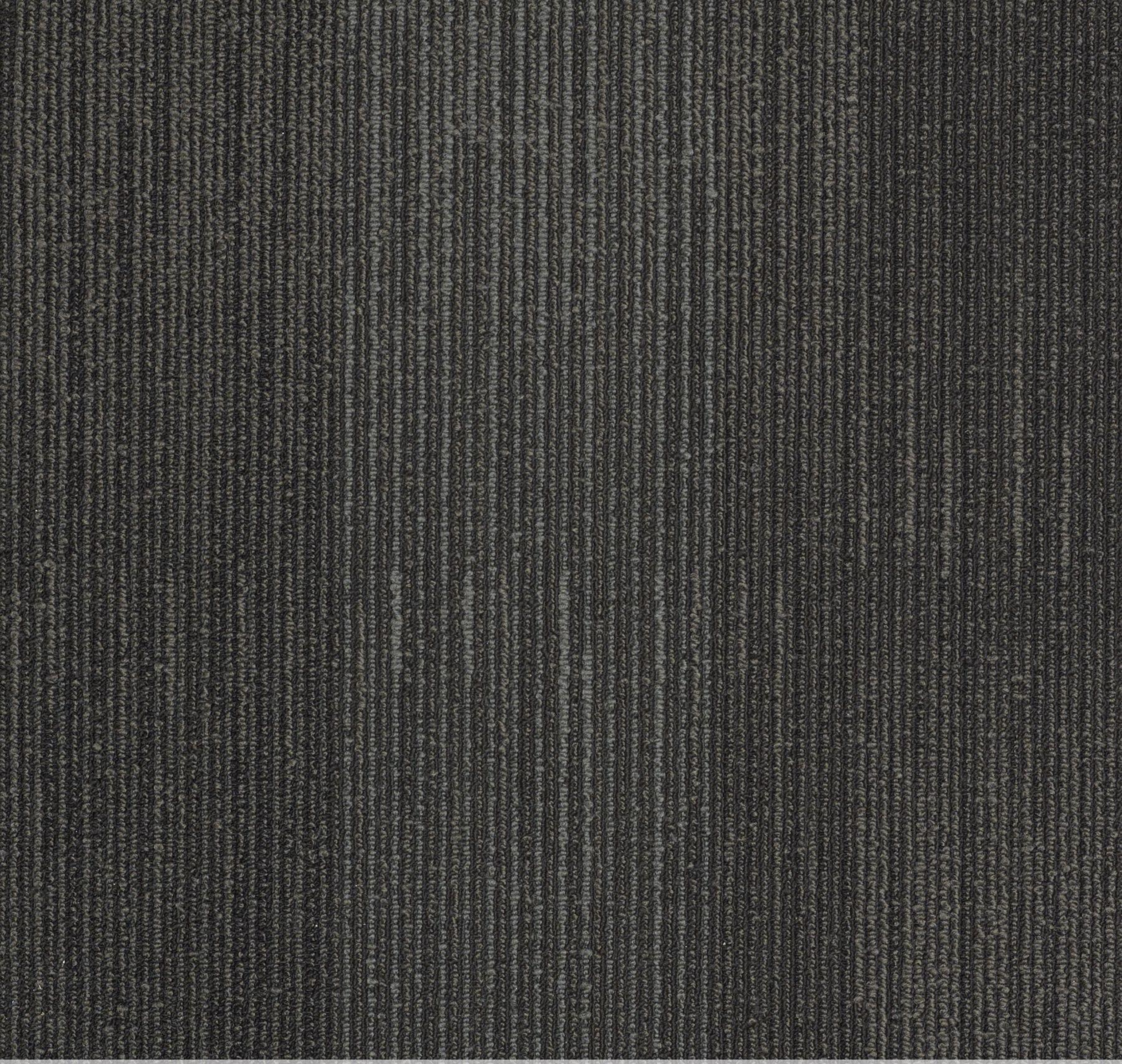


Style: 5T069 reverse tile | Color: 69335 flip

The product rendered in this room scene may not be an exact representation of actual flooring.
Style: 5T069 reverse tile | Color: 69335 flip | Install Method: quarter turn

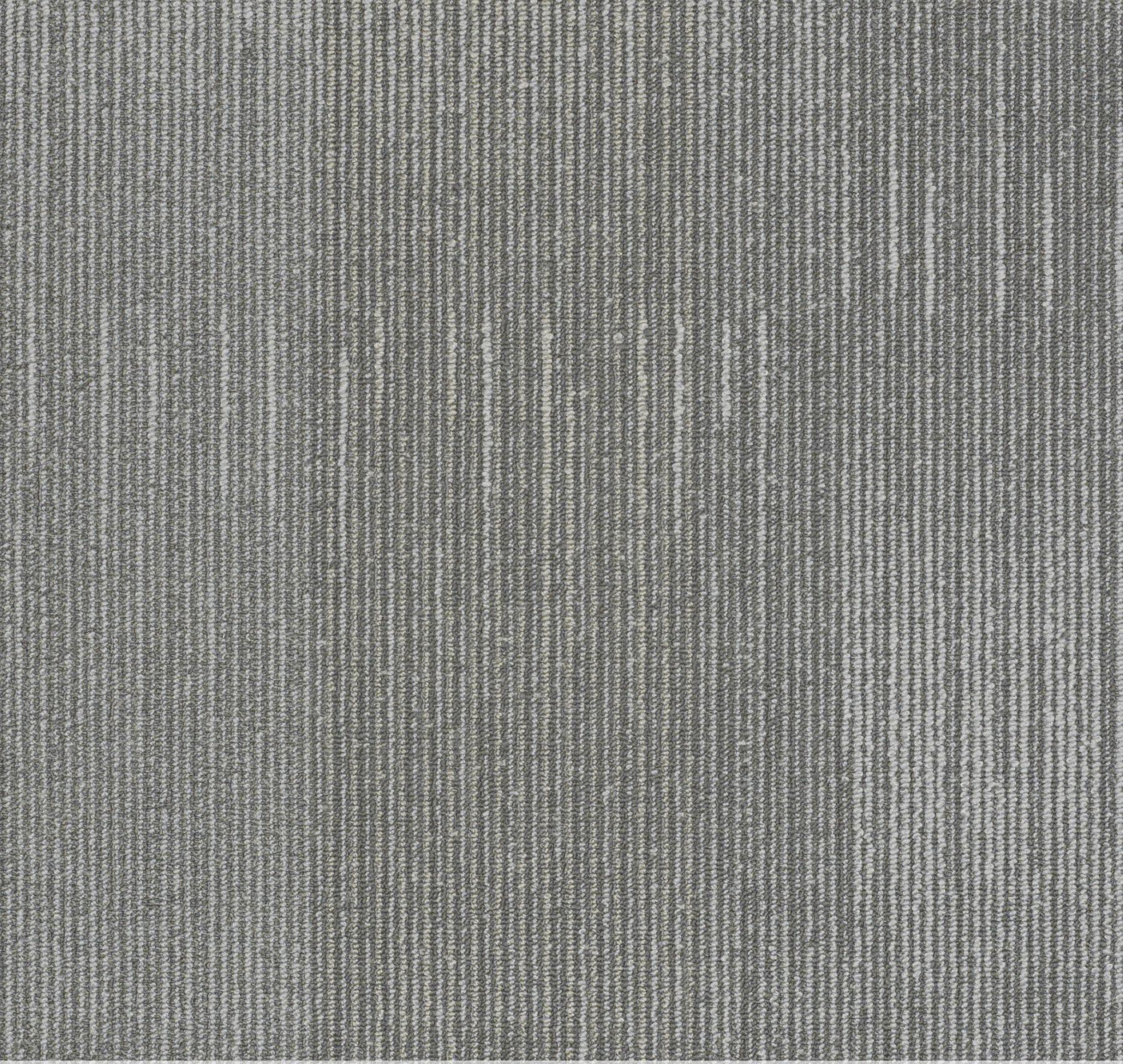
Style: 5T069 reverse tile | Color: 69755 range

The product rendered in this room scene may not be an exact representation of actual flooring.
Style: 5T069 reverse tile | Color: 69755 range | Install Method: quarter turn



Style: 5T069 reverse tile | Color: 69505 zone

The product rendered in this room scene may not be an exact representation of actual flooring.
Style: 5T069 reverse tile | Color: 69505 zone | Install Method: quarter turn

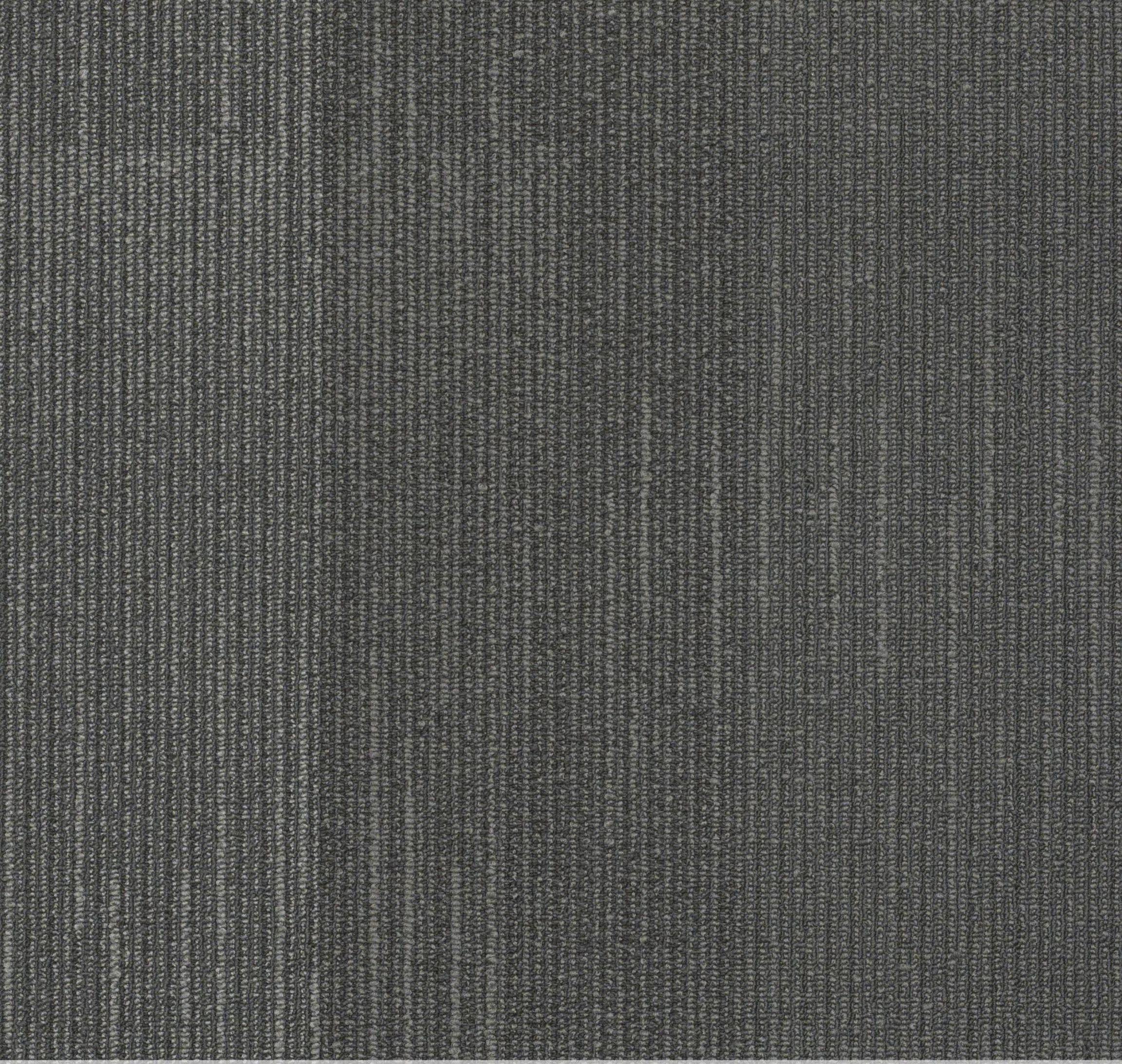


Style: 5T069 reverse tile | Color: 69530 gaze

The product rendered in this room scene may not be an exact representation of actual flooring.
Style: 5T069 reverse tile | Color: 69530 gaze | Install Method: quarter turn

Style: 5T069 reverse tile | Color: 69557 outlook

The product rendered in this room scene may not be an exact representation of actual flooring.
Style: 5T069 reverse tile | Color: 69557 outlook | Install Method: quarter turn

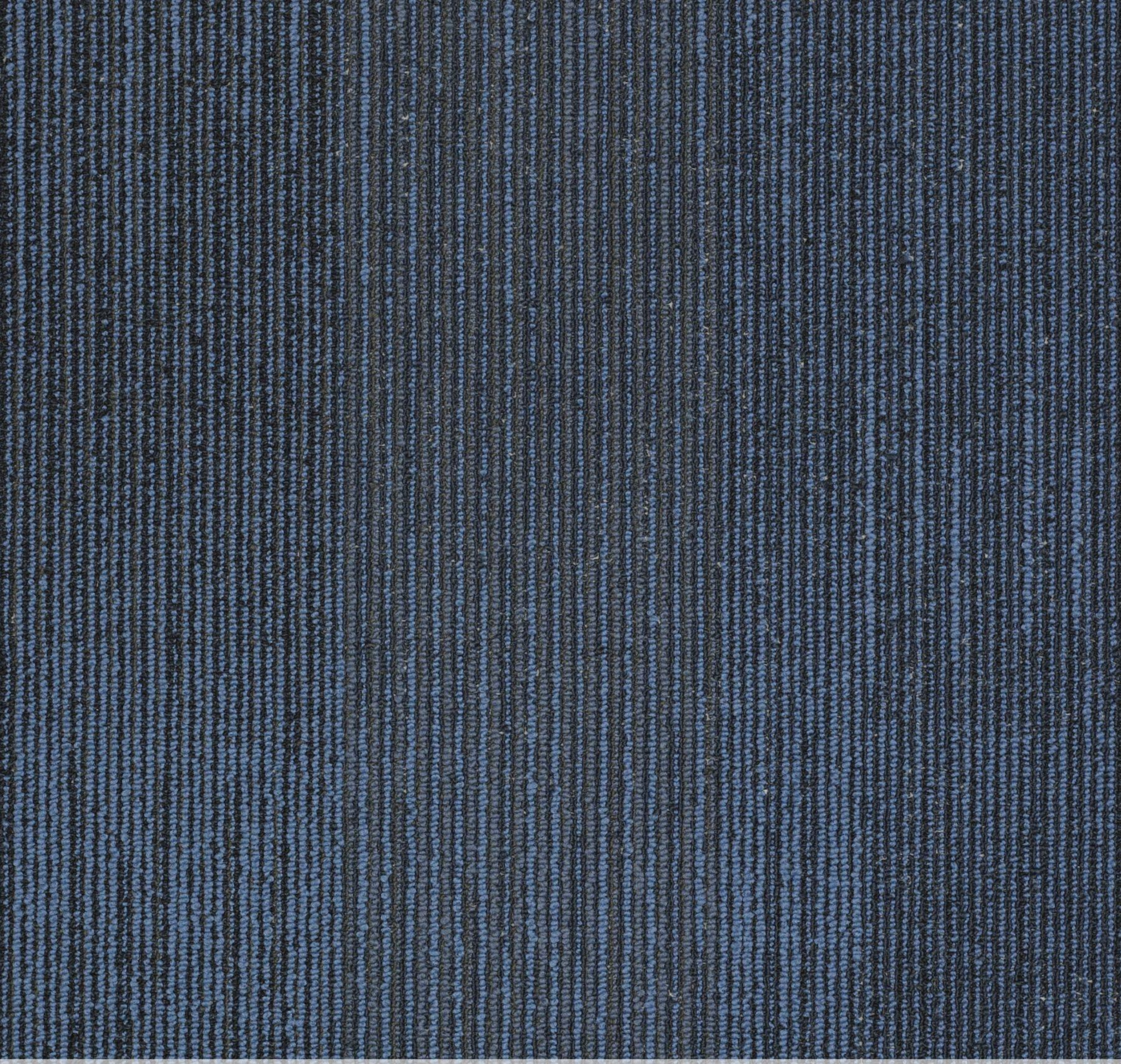


Style: 5T069 reverse tile | Color: 69597 distance

The product rendered in this room scene may not be an exact representation of actual flooring.
Style: 5T069 reverse tile | Color: 69597 distance | Install Method: quarter turn

Style: 5T069 reverse tile | Color: 69481 vista

The product rendered in this room scene may not be an exact representation of actual flooring.
Style: 5T069 reverse tile | Color: 69481 vista | Install Method: quarter turn



Style: 5T069 reverse tile | Color: 69496 horizon

The product rendered in this room scene may not be an exact representation of actual flooring.
Style: 5T069 reverse tile | Color: 69496 horizon | Install Method: quarter turn

Style: 5T069 reverse tile | Color: 69500 space

The product rendered in this room scene may not be an exact representation of actual flooring.
Style: 5T069 reverse tile | Color: 69500 space | Install Method: quarter turn

ShawContract®

reverse tile

product type:	**carpet tile**
collection:	**View**
style number:	**5T069**
construction:	**multi-level pattern loop**
fiber:	**eco solution q® nylon**
dye method:	**100% solution dyed**
primary backing:	**synthetic**
secondary backing:	**ecoworx® tile**
protective treatments:	**ssp® shaw soil protection**
warranty:	**lifetime commercial limited**

	u.s.	metric
product size:	**24.0 x 24.0 inches**	**61.0 x 61.0 cm**
gauge:	**1/12 inch**	**47.2 per 10cm**
stitches:	**8.5 per inch**	**33 per 10cm**
finished pile thickness:	**0.095 inches**	**2.41 mm**
average density:	**5684 per cu.yd.**	**0.211 g/cm3**
kilotex:		**8.70 kilotex**
total thickness:	**0.221 inches**	**5.61 mm**
tuffted weight:	**15.0 oz/yd2**	**508.6 gms/sqm**

recommended installation method


monolithic


quarter turn


ashlar


brick


random

coordinating products

broadloom: **transfer, modify, switch**
carpet tile: **shape tile, direction tile, realm tile, field tile, scape tile**

performance + testing

antimicrobial assessment:	**passes (AATCC-174) (When installed using Shaw 5036 adhesive)**
pill test:	**pass**
radiant panel:	**class I**
nbs smoke:	**less than 450**
electrostatic propensity:	**less than 3.5 kv**

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February 10, 2020

product transparency

Shaw Contract is dedicated to providing clients with a building chemistry that's safe and dependable. Working together, we will help you meet your goals as they pertain to material health. EcoWorx products with Eco Solution Q nylon are Cradle to Cradle Certified (tm) Silver and assessed for impacts on human health and the environment. This product can be recycled. When it's time to replace, we can collect and recycle it through our Environmental Guarantee.*

attributes + certifications

Cradle to Cradle Certified™	**silver level (version 3.1)**
Health Product Declaration (HPD):	**1,000 ppm disclosure**
Environmental Product Declaration (EPD):	**3rd party certified in accordance with ISO14044, ISO14025 & EN15804**
Living Building Challenge (LBC):	**free of red list chemicals**
Declare:	**LBC compliant**
nsf 140:	**gold**
CRI Green Label Plus (GLP):	**USA (GLP9968) | China (GLP1263)**
Building Research Establishment (BRE):	**certified**
Good Environmental Choice Australia (GECA):	**certified**
Singapore Green Label:	**039-003**
ce marking (EN 14041):	**3rd party certified**
environmental guarantee*:	**free pickup & delivery available north america**
total recycled content:	**47% (post industrial 47% | post consumer 0%)**
product packaging:	**100% recyclable**
country of origin**:	**China & USA**

green leed contribution credit

MR Credit: Building Product Disclosure and Optimization Environmental Product Declarations - Option 1. Environmental Product Declaration (EPD)	**3rd party certified in accordance with ISO14044, ISO14025 & EN15804**
MR Credit: Building Product Disclosure and Optimization Material Ingredients - Option 1: Material Ingredient Reporting	**HPD (version 2.1) or C2C silver level (version 3.1)**
MR Credit: Building Product Disclosure and Optimization Material Ingredients - Option 2. Material Ingredient Optimization	**C2C silver level (version 3.1)**
MR Credit: Building Product Disclosure and Optimization Sourcing of Raw Materials - Option 2: Leadership Extraction Practices	**environmental guarantee: free pickup & delivery available north america**
EQ Credit: Low Emitting Materials Option 1. Product Category Calculations	**green label plus certification: GLP9968**
MR Credit: Interiors Life-Cycle Impact Reduction Option 3. Design for Flexibility	**ecoworx tile w/ lokdots installation system**

additional information

* To learn more about the recyclability of our products and our Environmental Guarantee, please visit shawcontract.com.

**Meets or exceeds all local and national regulations in country of manufacture.

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February 10, 2020

LVT STANDARD

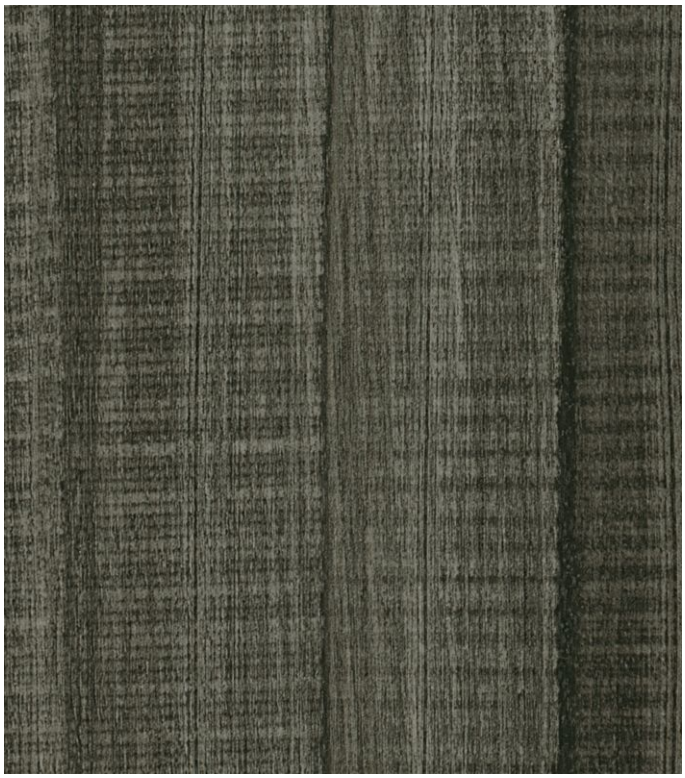
PHILADELPHIA COMMERCIAL

RESILIENT COLLECTION

IN THE GRAIN II

English Grey 05012

Oakwood 07007



Ember 05016

Cotton Seed 07004

English Grey 05012


Oakwood 07007

Ember 05016

Cotton Seed 07004

In the Grain II 30

Style Name	In the Grain II 30	
Style Number	5536V	
Construction	Performance Luxury Vinyl Tile	
Class / ASTM F1700	Class III Printed Film Vinyl Tile, Type B (embossed)	
Finish	ExoGuard+	
	U.S.	Metric
Nominal Dimensions	6 in w, 48 in l	15 cm w, 122 cm l
Actual Dimensions	5.96 in w, 48 in l	15.14 cm w, 121.92 cm l
Wear Layer Thickness	30 mil (0.03 in)	0.76 mm
Overall Thickness	0.118 in	3 mm
Installation	Direct Glue	
Recommended / Required Adhesive	Shaw 4100 or S150	

Packaging

Pieces per box	18 pcs	
Area per box	35.76 sq ft	3.32 sq m
Weight per box	38 lbs	17.24 kg

Performance Testing

Static Load (ASTM F970)	Passes (Modified), 1500 PSI
Residual Indentation (ASTM F1914)	Passes
Resistance to Heat (ASTM F1514)	Passes
Resistance to Light (ASTM F1515)	Passes
Resistance to Chemicals (ASTM F925)	Passes
Smoke Density (ASTM E662, Flaming Mode)	Passes
Radiant Panel (ASTM E648)	Passes, Class I

Warranties

Resilient 15 Year Commercial Limited Warranty

Environmental

Indoor Air Quality	FloorScore® Certified

PAINT COLOR STANDARD

Cliffside

Whiter Shade

Toasted Wheat

Russian White

C-2

Khaki Green

Quiet Light

Ascot Blue

Mindful Gray

Grizzle Gray

BIT WIRING SPECIFICATION

Bureau of Information and Telecommunications
Office of Telecommunications

Foreword

Major advances in telecommunications technologies have taken place in the past two decades and those advances have resulted in unprecedented acceptance of networking by the client community. That acceptance has meant:

- More demand for network services and the associated network connection equipment.
- Upward pressure on network speeds.
- Demand for better and friendlier user station connections.
- Changing requirements for connection mediums.

The most basic of networking elements, wiring, has had to keep pace with the networking advances and changes. The days of the old twisted copper pairs with their attendant technologies, installation procedures and physical layouts have given way to advanced wiring techniques, facilities, planning, processes and indeed, more specialized types of cable. Modern networking success or failure rests on access to the right type of wiring.

Through the years the State of South Dakota has, in most locations, been able to stay current with wiring technologies. However, staying current doesn't mean there aren't concerns about the future. At some point there will be a need for some expensive and time consuming wiring upgrades, wiring fixes, testing and other major wiring revisions.

Along with standards there must be recognition of the fact that in state government there has never been and probably never will be total freedom from economic pressures which often result in compromises in what the planners would like to install and what can realistically be installed. However, with solid standards in place compromises need not have a negative impact nor prevent installation of modern cabling components.

Standards Introduction

The term "State", for purposes of these Standards, will include the State of South Dakota, South Dakota Higher Education, State institutions, and State personnel and facilities.

In addition to any standards set forth by the State, the national ANSI/TIA/EIA standards will be used as rules and guidelines in any State facility. Contractors are expected to be familiar with all applicable national standards. In terms of this document the most important of such standards, although others may apply, are:

- ***ANSI/TIA/EIA-606*** *– the Administration Standard for the Telecommunications infrastructure of Commercial Buildings. This standard specifies a generic voice and data cabling system that supports multi-product, multi-vendor environments. Also addressed are planning and installation of a structured cabling system and performance and technical criteria for cable and connecting hardware.*
- ***ISO/IEC 11801*** *– Information Technology-generic cabling for customer premises. This standard addresses specifications for telecommunications installations, requirements for a structured cabling system, performance, topology, cabling distances, installation practices and channel performances. Category 5, 6, and 7 are covered in 11801.*
- ***ANSI/TIA/EIA-568-B*** *– which covers UTP cabling categories. There are a number of addenda to this standard, including the ones with cross reference charts for cabling specifications.*
- ***TIA/EIA TSB75*** *– Open Office Cabling. This standard provides additional specifications for horizontal cabling in areas with movable furniture and partitions*
- ***ANSI/TIA/EIA-569-A*** *– This standard has applications pertaining to telecommunications closets.*
- ***TIA/EIA TSB67*** *– Transmission Performance Specifications of Field Testing of UTP Cabling Systems.*
- ***TIA/EIA TSB72*** *– Centralized Optical Fiber Cabling Guidelines – which contains information and guidelines for single tenant and centralized optical fiber cabling.*

The State will utilize multimode and single mode fiber, fiber apparatus solutions, high speed cable, Gigabit Ethernet, channel solutions, test equipment, fiber-duplex data networks, fiber-to-the-desk, unshielded twisted pair, and copper cabling, voice grade and T1 ABAM.

All standards will be based on an approach called ***Structured Building Wiring System***, often referred to as ***BWS***. This type of system develops building wiring plans, for low voltage telecommunications systems and networks that create flexible and modular wiring systems capable of adapting to new requirements and technologies. A Structured Building Wiring System will support changing technology requirements and will be capable of being easily modified to support additional workloads or requirements.

Within the Structured Building Wiring System is a standard of a Redundant Riser Backbone, which is a basic cabling infrastructure plan for a building consisting of multimode and single mode strands of fiber, voice grade copper pairs, pairs of T1 ABAM cable and a P3-500JCAR video riser coaxial cable. Cable sizes are determined by the size of building, technology needs and number of occupants.

Fundamental concepts of a Structured Building Wiring System are as follows:

- Over the life of any State owned or rented building major or minor remodeling occurs at least every five years. Our Standards recognize changes will occur and future enhancements or expansions will be a consideration at remodeling or construction time.
- Over the life of any State owned or rented building telecommunications equipment and functionality will change dramatically. These standards will recognize that fact and stay independent from specific vendor equipment or media.
- Telecommunications now either provides facilities for or is directly involved with other building systems such as environmental controls, security devices, audio, visual, alarms and sensory equipment and all standards must recognize that fact during and after the planning and installation phases.
- Policies within different telephone company areas may vary, in terms of delivery of service. This may require some standards modification.
- Standards, to be effective, must apply to all entities who are involved in planning, engineering, construction, remodeling or maintenance of State owned or rented buildings.

1. Design and Standard Considerations:

There are seven subsystems to be considered in a Structured Building Wiring System. These are as follows:

1.1. Building Entrance:

1.1.1. Building entrance facilities provide the point at which outside cabling interfaces with the intrabuilding backbone cabling. The physical requirements of the network interface are defined in the most recent EIA/TIA-569 Standard.

1.2. Equipment Room:

1.2.1. The design aspects of the equipment room are specified in the most recent EIA/TIA 569 Standard. Equipment rooms usually house equipment of higher complexity than telecommunications closets. Any or all of the functions of a telecommunications closet may be provided by the equipment room.

1.3. Backbone Cabling:

1.3.1. The backbone cabling provides interconnection between telecommunication closets, equipment rooms and entrance facilities. It consists of the backbone cables, intermediate and main cross connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection. This includes:

1.3.1.1. Vertical connection between floors (risers).
1.3.1.2. Cables between an equipment room and building cable entrance facilities.
1.3.1.3. Cables between buildings (interbuilding).

1.3.2. Cabling types recognized and maximum backbone distances are specified in the TIA/EIA-568B Design Considerations and those specifications will be the standards. However, backbone distances are always dependent on the application and 568A distances, as shown are maximum. Note also the 90 meter distance for STP applies to applications with a spectral bandwidth of 20 MHz to 300 MHz. A 90 meter distance also applies to UTP at spectral bandwidths of 5 MHz - 16 MHz for CAT 3, 10 MHz-20 MHz for CAT 4, 20 MHz-100 MHz for CAT 5 and 5e, 200 MHz for CAT 6

1.3.2.1. In summary the actual distances depend on the type of system, data speed and the manufacturer's specifications for the system electronics and the associated components used (i.e., baluns, adapters, line drivers, etc.). Current state-of-the-art distribution facilities usually include a combination of both copper and fiber optic cables in the backbone.

1.4. Other Design Requirements:

1.4.1. Star topology
1.4.2. No more than two hierarchical levels of cross-connects
1.4.3. Bridge taps are not allowed
1.4.4. Main and intermediate cross-connect jumper or patch cord lengths should not exceed 20 meters (66 feet)
1.4.5. Avoid installing in areas where sources of high levels of EMI/RFI may exist
1.4.6. Grounding should meet the requirements as defined in the most recent EIA/TIA 607

1.4.6.1. Note: The Contractor must consult with equipment manufacturers, application standards and system providers for additional information when planning shared sheath applications on UTP backbone cables.

1.5. Telecommunications Closet:

1.5.1. All new installations will use a universal jack format. All horizontal cabling & any accessories (riser cabling or fiber) will be installed in either a wall rack of floor mounted rack.

All existing add-ons will utilize formats in place unless otherwise directed.

1.5.2. Telecommunications closets are basic service requirements. Each closet will be approximately 150 square feet and shall be located within 90 cable meters of all telecommunications outlets. If there are limitations on the 90 cable meters standard then more than one closet will be required.

1.5.3. The closet(s) will contain termination equipment for service entrance wiring and horizontal telephone, data and video wiring, per OTC standards. Voice terminations shall be Category 5e 110 type, or if existing is 66 block, duplicate existing. All will be wall mounted the same as with all service electronics. Standard 7' by 19" equipment racks will be provided for Category 5e data patch panels, fiber patch panels, network electronics and backbone connection equipment. Grounding and service entrance protection shall be provided per NEC requirements and OTC standards.

1.5.3.1. Horizontal wiring from the Telecommunications closet(s) to each telecommunications outlet shall be provided. Wiring for voice and data wiring shall be an individual enhanced Category 5e cable for each jack per OTC standards. Wiring for video services shall be RG-6. Wiring from the outlet to the ceiling space will be concealed in the wall whenever possible and if concealment is not possible wiring will be provided in surface mounted plastic raceway. Wiring extended above accessible ceilings may be run in conduit, cable tray or "J" hooks. Wiring extended above drywall ceilings must be in conduit, with all junction boxes accessible.

1.5.4. Outlets for telecommunications services shall be provided throughout the facility. Each outlet shall contain voice, data and video jacks as required, mounted within a common faceplate. Voice and data jacks shall be Category 5e. Video jacks shall be "F" or BNC connectors depending on application. Exact locations for each outlet shall be determined during the design process.

1.5.5. All design, installation and materials shall be in accordance with applicable BICSI, EIA, and TIA standards.

1.6. Horizontal Cabling:

1.6.1. The specified topology will be Star. The horizontal cabling system extends from the work area telecommunications outlet to the telecommunications closet and consists of the following:

1.6.1.1. Horizontal Cabling

1.6.1.2. Telecommunications Outlet

1.7. Cable Terminations:

1.7.1. Cross-connections

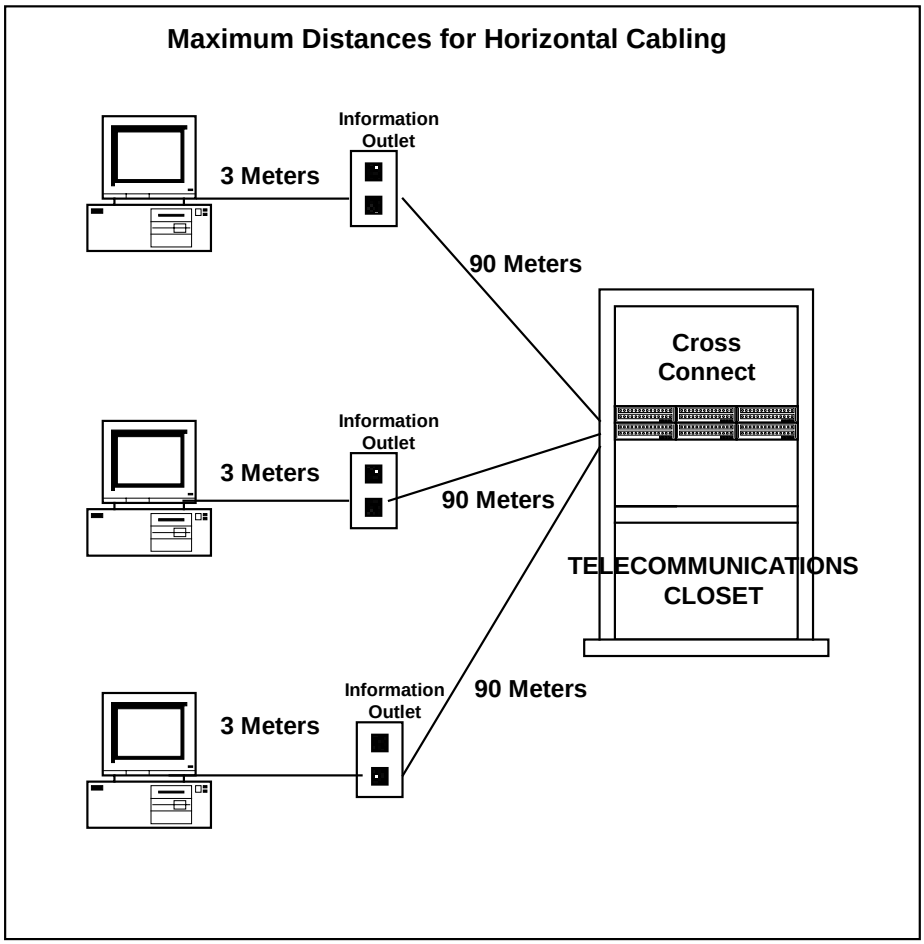
1.7.1.1. Three options are recognized as options for horizontal cabling:

1.7.1.1.1. 4 pair 100 ohm UTP cable (24 AWG solid conductors) - maximum distance of 90 meters.

1.7.1.1.2. 62.5/125 optical multi mode fiber cable

1.7.1.1.3. Single mode fiber

1.7.1.1.4. OM3 and OM4 fiber



In addition to the 90 meters of horizontal cable, a total of 10 meters is allowed for work area and telecommunications closet patch and jumper cables.

2. General Wiring Standards

2.1. Building Distribution Systems:

2.1.1. All equipment and materials shall conform to current applicable EIA/TIA 568 and 569 standards and must be UL listed and labeled unless otherwise indicated. Unless more rigid specifications are sought by the agency or governmental unit in charge of the installation, all equipment and materials shall comply with current codes, standards and regulations. The National Electrical Code shall be used only for minimal requirements and not as design criteria. All applicable local, state, and federal construction regulations, standards, and practices associated with a project shall apply and will be followed. Where requirements of the specifications or standards conflicts with existing rules or regulations the State will be notified in writing and will render a decision before any work is performed.

2.2. Workmanship:

2.2.1.1. Workmanship and neat appearance will be as important as the electrical and mechanical integrity of the system. Note the following:

2.2.1.1.1. Station wiring must have a neat appearance when complete and must use wall, modular furniture or floor outlet boxes whenever possible.

2.2.1.1.2. Outlet boxes and wiremolds painted to match existing wall color and a surface mount outlet must be used where flush mounted boxes can not be installed.

2.2.1.1.3. Use of wiremold and surface mount jacks must be approved by the State before use.

2.2.1.1.4. Magnetic mounts to metallic surfaces and adhesive backed surface mounts for outlets are not recommended except in special, approved circumstances.

2.3. Cable Location (Direct Burial):

2.3.1. The State shall provide cable locating services for all types of communications systems. All locations of cables shall be marked with the appropriate color.

2.4. Approval and Review Procedures:

2.4.1. No deviations from the requirements of these standards will be permitted unless approved by the State. Any changes or requested changes using substitute materials from the specifications will require approval by the State in written change order before insertion into the work order or authorization.

2.5. Warranty:

2.5.1. The vendor performing wiring work for the State, its institutions, or Higher Education must warrant all work and materials, notwithstanding any manufacturers warranties. The vendor's warranty shall include but not be limited to, workmanship, equipment, testing, maintenance and support services. Equipment and materials shall be free from defects for at least two years from date of acceptance. The vendor must, at the vendor's expense, correct, repair, or replace all defective workmanship, equipment or materials.

3. Project Specific Standards

3.1. Service Entrance:

3.1.1. Telecommunications facilities must enter and terminate in a location where they serve the occupants of a building. The entrance facility consists of the path these facilities follow on private property that includes the entrance point through the building wall and the pathway continuing to the entrance room or space. The service entrance path is usually from an underground path through the building wall for connecting the Local Exchange Carrier (LEC) to the building wiring plant.

3.1.2. The MDF room or space is the component of the entrance facility that provides space for the termination of entrance and vertical riser cable. It may contain network interface devices and telecommunications equipment. When telecommunications equipment is located in the entrance room or space the entire room or space shall meet the requirements for an equipment room since additional space will be needed.

3.1.3. The size of pathways between the entrance point and the entrance room or space shall be the same as the entrance pathways unless the route is through open accessible areas. In such cases the pathway placed may be only for those cables initially installed with supporting structure adequate to accommodate future pathway requirements.

3.2. Entrance Considerations:

3.2.1. The State will be responsible for constructing various distribution conduit pathways to support the cable plant facilities. Included within this scope of work are easements, permits, and right-of-ways. The State's responsibilities will include notification of all Local Exchange Carriers and telecommunications providers that will be involved in providing service to or in any State building.

3.2.2. The State or agency must construct various distribution conduit pathways, from such sites as main terminal locations or building entrance locations to the property line or manhole to support the cable plant facilities.

3.2.3. All trenching within a public right-of-way owned by or under the jurisdiction of the State or Higher Education must conform to the proper codes.

3.3. Conduit:

3.3.1. The designs of any entrance conduit or duct system must be reviewed by appropriate personnel in the State Engineer's and the Bureau of Information and Telecommunications (BIT) offices.

3.3.2. A standard entrance wiring requirement formula, of at least three cable pair per 160 square feet of office space, will be used to determine size of entrance cable. All entrance cable will be continuous and will be installed from the designated property line to the Main Distribution Frame (MDF). The following are requirements for the conduit installation:

3.3.3. All single 4" conduit lengths must have true circular cross sections providing a clear even raceway. Conduit ends must be tapered.

3.3.4. Any damaged ends must be cut off and the end re-cut in a manner that will produce the same taper and bevel as the original ends.

3.3.5. Change to steel conduit must be made with steel to PVC or steel to polypropylene adapters.

3.3.6. In making joints the ends and couplings must be coated with joint adhesive or sealing compound approved by the duct manufacturer and driven into a tight, waterproof fit.

3.3.7. Conduit ending in manholes, building entrances, etc., must be terminated with waterproof bell ends or conduit terminators.

3.3.8. Spare ducts terminating outside a manhole must be sealed with waterproof caps.

3.3.9. All vacant ducts terminating inside buildings or manholes must be sealed at each end with mechanical duct plugs. Cable filled ducts throughout the conduit distribution system must be sealed with expandable urethane foam. Vacant ducts must contain a 5/16 inch polyethylene pull rope.

3.3.10. Distribution conduit and multiple plastic ducts must be sized to allow at least a 25% growth for any type of cable installed.

3.3.11. All ends of metallic conduit are to be bushed and electrically bonded and grounded.

3.3.12. Conduit Allocation Requirements:

3.3.12.1. All differing cable types will be installed in separate conduits, cells or innerducts throughout the distribution duct system. The exception to this rule is cable installation in State approved direct cable routes. The State will allow the use of innerduct

installed within the 4 inch diameter conduit or cell for fiber optic or other types of specialized cable. However, in instances where innerduct will be used a separation of twisted pair, fiber optic, and other specialized cable must be maintained. Certain rules will apply:

3.3.12.2. Copper conductor twisted pair cable will be installed in the 4 inch primary conduit or cell only. Innerduct is not acceptable for twisted pair without prior approval by the State.

3.3.12.3. Coaxial and/or specialized cable must be installed in innerduct is a separate conduit or cell from that used for twisted pair or fiber optic.

3.3.12.4. All necessary steps must be taken to ensure sheath continuity for grounding purposes.

3.3.13. Conduit Testing:

3.3.13.1. All conduit distribution routes associated with any new system will be tested and verified after installation activities and all major plant rearrangements have been completed. Each conduit section will be fully tested for integrity with a mandrel before installing additional sections. The vendor will supply complete testing and correction reports, information, and explanations to the State for review prior to acceptance of the conduit distribution system.

3.3.14. Entrance Conduit Capacity:

3.3.14.1. The following schedule will be used for entrance conduit unless additional conduits are required for other telecommunications needs.

Number of Pairs	Conduit Required
1 to 1,000	One 4” and one spare 4”
1,001 to 2,000	Two 4” and one spare 4”

3.3.14.2. The type of conduit or ductwork installed must be approved by the State prior to installation.

3.3.14.3. If the entrance cables will include fiber optics the fiber optic cable shall be placed in a separate conduit designed for fiber. CATV or other signal grade service will be placed in separate like entrance conduits or in segmented 4” existing conduit.

3.3.14.4. Fiberglass of PVC Type D conduit is preferable for any section of conduit exposed to sunlight.

3.3.15. Conduit Bends:

3.3.15.1. Undesirable bends in underground conduit and duct are sometimes necessary. In such cases two 90 degree bends are permitted providing they have a radius not less than six times the internal diameter of conduits two inches or smaller or ten times the internal diameter of conduit larger than two inches. Such bends are permitted in other than steel conduit and the bend section shall be encased in concrete.

3.3.16. Pull Boxes:

3.3.16.1. Pull boxes will be installed in any conduit run with more than two 90 degree bends or conduit with a reverse bend. Pull boxes will be installed on runs longer than 150 feet. For conduit 2 ½ inches or larger, terminating in a pull box, the minimum length of the pull box will be sixteen times the diameter of the largest conduit terminating in the pull box.

3.3.17. Drain Slope:

3.3.17.1. Underground conduit should be installed such that a slope exists at all points of the run to allow drainage and prevent the accumulation of water. Where water infiltration in anticipated an exterior drainage box shall be installed at the entrance point.

3.3.18. Conduit Infiltration:

3.3.18.1. All conduits shall be plugged to restrict infiltration of gas, water and vermin. An external venting system may be needed to ensure gases do not enter a building.

3.4. Cable Splicing:

3.4.1. All cables designed to carry low voltage signals into the building, for the vertical riser systems or the horizontal distribution system, must meet the following rules:

3.4.1.1. Cable must be splice free from the building entrance to the termination point except for a single non plenum to plenum or transitional splice when the cable enters the building.
3.4.1.2. If a transition splice must be made in a plenum area the non plenum cable and the splice must be encased in an approved plenum rated material.
3.4.1.3. All intrabuilding splice cases will be rack and hook mounted or secured through a method approved by the State.
3.4.1.4. No splices of any types will be pulled into conduits or innerducts.
3.4.1.5. All cable splicing will be of at least 3M or AT&T 710 modules. If pairs are not spliced they must be cleared, capped and waterproofed.
3.4.1.6. Splicing of station wiring will not be allowed.

3.5. Aerial Entrances: Aerial and rooftop entrances are strictly prohibited without prior approval from the State Engineer's office.

3.6. Antennae Entrance: Antennae field entrance rooms shall be designed per applicable building and electrical code. The antennae pathway from the antennae field to the entrance room shall provide isolation from the antennae cables from other backbone cables. The antennae entrance room shall be located as close as practicable to the antennae field.

3.7. Entrance Point: An entrance point is a component of the service entrance facility and is the point of penetration of the foundation wall. The 4 inch metal conduit or sleeve will be the only pathway used for the entrance point, will extend 4 inches above the finished floor or 4 inches below the finished ceiling if ceiling entrance.

3.8. Lightning Protectors: The National Electrical Code requires properly grounded protectors on incoming telephone cable. All copper entrance cable will be terminated on properly grounded 2 stage gas tube protection and shall be UL approved for all types of inter-building wiring. The installation and grounding will conform to current NEC codes and customer provided equipment vendor's specifications.

3.9. Permits, Easements and Rights-of-Ways: All trenching within a public right-of-way owned by or under the jurisdiction of the State must conform to the appropriate codes. The State will be responsible for obtaining permits and for ensuring the most current standards are met.

3.10. Entrance Room or Space: The entrance room or space is the component of the entrance facility that provides space for the termination of entrance and backbone cable. If the entrance room or space contains telecommunications equipment the entire room or space must meet the requirements for an equipment room otherwise the space must meet the requirements for a telecommunications closet.

3.10.1. The room or space must be located in a dry area not subject to flooding and as close as practical to the entrance point.

3.10.2. Entrance Room Size:

3.10.2.1. The following tables specify space requirements, that differ from Telecommunications Closets or Equipment Rooms, for all telecommunications equipment and associated cross connects for the building MDF. The distance from rack to work station shall not exceed 250 feet and if such is needed additional room facilities must be provided. If the MDF is 50 feet or more from the network demarcation point then the cable must be in conduit.

Floor Space – Sq. Ft.	Dimensions – Ft.
0 to 500,000	12 X 14
500,000 to 600,000	12 X 15.6
600,000 to 700,000	12 X 18.3
700,000 to 800,000	12 X 22.3
800,000 to 1,000,000	12 X 27.7

3.11. Campus Environment: In locations where there will be more than one building on the same continuous property conduit equal to the amount of entrance conduit described above will be required. It shall be between any newly proposed building and the location of the MPOP. If existing buildings have fiber optic cable installed a separate conduit of at least three inches in diameter should be run from the MPOP t any newly proposed building, with interduct and a pull rope.

4. Vertical Riser Systems

4.1. General:

4.1.1. A building riser system is a vertical arrangement connecting floors in a multistory building. The same function of connectivity can be served by a lateral riser system to support a horizontal distribution system. This system consists of the intrabuilding cable that cross connects the Building Entrance Terminal (BET) in the entrance room to each IDF in the Telecommunications Closets. It also cross connects the MDF location to each IDF in the building housing the MDF.

4.1.2. Riser Closets:

4.1.2.1. The locations follow the specifications of the Telecommunications Closets or equipment rooms. For new construction or major renovations they shall be aligned vertically. This is where the cable is spliced or cross connected to other distribution cables or wire, such as the horizontal distribution system.

4.1.3. Riser Distribution:

4.1.3.1. Riser conduits shall connect the MDF to each Intermediate Distribution Frame (IDF) located on each floor. For all new construction or major renovation all riser conduits shall be vertically aligned to allow for more efficient and economical cable installations.

4.1.3.2. Sleeves or slots consist of short segments of metal tubes protruding one inch to help prevent miscellaneous materials from falling through the holes between floors. Sleeves or slots shall be used for installations in IDF rooms that are vertically aligned. They should be adjacent to the wall that will support the riser cables. The following guidelines will apply:

4.1.3.3. Sleeves should extend 1” above the floor level and slots should extend a minimum of 1” high curb.

4.1.3.4. Requirements will be two 4” sleeves per closet up to 50,000 square feet of office space. One spare sleeve and one additional sleeve for each additional 100,000 square feet of office space will be required.

4.1.3.5. If slots are used in place of sleeves the slot shall be 6” X 9” for up to 250,000 square feet of office space and 6” X 18” for 250,000 to 600,000 square feet.

4.1.4. Conduit or metallic raceways shall be used to run cables point to point when intermediate splices or terminations are not required. This includes dedicated fiber to a specific point or a high degree of security. The applicable guidelines for the building entrance conduit apply along with the following:

4.1.4.1. Conduit or metallic raceways shall be used when it is not possible to vertically align IDF rooms.

4.1.4.2. Conduit not being used must be threaded and capped at both ends.

4.1.4.3. Bend radius and tensile strength rating shall not exceed the manufacturer’s specifications at any time. Maximum for conduit shall contain no more than two 90 degree bends, the inside radius of the bends not less than 10 times the normal diameter of the conduit and not less than 24”.

4.1.4.4. All inside building conduit runs exceeding two 90 degree bends or 150 feet shall have accessible pull boxes. Conduit runs must not have square or oval conduit fittings.

4.1.4.5. 200 pound strength, 3/32 inch OD polyethylene pull lines must be provided in each conduit.

4.1.4.6. Pull boxes in accessible positions, with screw covers, must be provided.

4.1.5. Riser Cable delivers telecommunications service from the LEC through the MDF to the IDF located on each floor for horizontal distribution. The actual transmission media may include twisted pair copper, coaxial or fiber optic cable.

4.1.6. Twisted Pair Copper: The following are the installation guidelines when twisted pair is used for riser cable.

4.1.6.1. Non splice riser cable will be required from the MDF to each IDF allowing for 30% riser cable growth.

4.1.6.2. A minimum of four pairs of riser cable for each workstation’s voice connection, served by the IDF, will be required.

4.1.6.3. Riser cable designated for telephone service will be Category 3 or 5e, 24 AWG, with standard telephone color coding.
4.1.6.4. All riser cable will be terminated and tagged at each end, with a labeling scheme provided by the State.

4.1.7. Fiber Optics: The following requirements shall be followed for fiber optics used for the vertical riser cable when such serves data applications:
4.1.7.1. The fiber shall be multimode or singlemode with LC connectors on either end.
4.1.7.2. Each fiber strand shall be identified at each end as specified by the State.
4.1.7.3. All termination hardware boxes and sleeves will be included.
4.1.7.4. The fiber optic cable shall be placed in innerduct, where space is available, to prevent damage by other cable.

4.1.8. Cable Fastening and Support for all station related cables, wires and associated equipment must be firmly held in place and be adequate to support loads with adequate safety factors. For large, heavy riser cable the State Engineer's Office should be consulted. Cables lying on ceiling tiles or other objects not specifically part of the Distribution System are not acceptable.

4.1.9. Building Riser Cable will be supported by State accepted cable clamps or support devices at intervals not to exceed 4 feet. Any deviation from these support requirements will require approval from the State.

4.1.10. Termination Blocks, AT&T Type 110 (110D) or equivalent, will be used when working with legacy wiring plant, Category 5e or designated for new construction or major renovation. All pairs shall be labeled with the labeling scheme provided by the State. All cable delivery telephone company services must be terminated on AT&T Type 110 or equivalent blocks in the MDF.

4.1.11. Fire Stopping requirements will be as outlined in the National Electrical Code (NEC) where specific requirements are imposed for building risers that prevent the spread of flame and smoke from floor to floor. Such requirements pertain to vertical riser systems, riser closets, and riser cable components of the riser system. Installation and maintenance activities must not interfere with fire detection or suppression devices. The State will hold the contractor responsible for damages caused by accidental discharge of fire suppressants.

4.1.12. Bonding and Grounding of the riser cable is an essential element of a building riser system and detail is found in the most recent TIA 607standard.

5. Office Specific

5.1. Offices:

5.1.1. Each office shall have a minimum of three outlets per 100 square feet.

5.1.1.1. Each outlet shall contain at least one voice and two data jacks, when multiple jacks are to be placed on the same wall they shall be combined into one outlet with multiple jacks under a common faceplate, which will help reduce costs.

5.2. Classrooms:

5.2.1. Each classroom shall have one outlet located in the center of the front wall.

5.2.1.1. The outlet shall contain one voice and three data jacks and one video jack.

5.2.1.2. Each classroom shall contain a single voice outlet located near the fixed podium or door to accommodate a wall telephone.

5.2.1.3. Additional outlets may be provided depending on the room use and application.

5.3. Laboratories:

5.3.1. Each lab will contain a minimum of two outlets, each containing one voice and one data jack.

5.3.2. If the room is also intended to function as a classroom a video jack will be required.

5.4. Other Notes:

5.4.1. Some State buildings may be “carrier neutral” and cabling contractors offering services to the State must be able to develop plans and strategies to achieve that position.

6. FIBER AND COPPER

6.1. BUILDING WIRING SYSTEM

6.1.1. General. This specification defines requirements for the Cabling Contractor (hereafter referred to as Contractor) to furnish, fabricate, install, test, and a warrant complete, operable data/voice communications building-wiring system (BWS). The following major BWS elements, implemented per BICSI standards, are included in this scope:

- Complete horizontal data/voice wiring closet-to-classroom/office work station drops (Station Drops)
- Complete copper risers
- Complete fiberoptic risers
- Wiring Closet Infrastructure
- Fire Stops
- BWS documentation, as stated here in.

6.1.2. Location of Work:

6.1.2.1. Work is located at locations throughout the State of SD as specified by the Buying Agency on its Purchase Order
6.1.2.2. Location of project meetings shall be at the headquarters location of the Buying Agency or pre determined location.

6.1.3. Specific Tasks. Contractor shall perform the following tasks for each assigned project:

6.1.3.1. Provide project specific submittals as stated here in
6.1.3.2. Mobilize its resources to initiate and complete specific portions of the BWS within agreed to time periods
6.1.3.3. Provide status of all on-going project activity via generating/updating project Gantt chart upon request for a specific project.
6.1.3.4. Attending project meetings weekly or pre approved schedule.
6.1.3.5. Coordination of activities with BIT Telecommunications and User Groups.

6.1.4. Conflicts in the Specifications/Drawings: Specifications and drawings work together. Work items required in one shall be binding as if stated in both. In the event there is conflict between the specifications/drawings that are not further delineated during the procurement process, the stricter requirement shall be observed. Contractor shall provide the stricter requirement in all cases as part of its Base-Bid

6.1.5. **COORDINATION**

6.1.5.1. **Coordination of Specifications:** This specification section references the following specification sections that Contractor shall coordinate with, as required, to provide a complete functioning BWS:

6.1.5.1.1. Fire Stop
6.1.5.1.2. Fiberoptic Cabling
6.1.5.1.3. Copper Cabling.

6.1.5.2. **Coordination with System Vendors and Contractors:** Contractor shall coordinate, as required, with all related system vendors (including the furniture vendor) and associated contractors. Depending upon the specific system vendors' products, the specific BWS issues can vary, therefore Contractor shall fully coordinate with the System Vendors and Contractors to ensure that all proper BWS is provided and installed.

6.1.5.3. **Coordination of Voice and Data Closets:** Contractor shall coordinate with all related trades and BIT Telecommunications to determine exact locations for the voice and data station drop terminations within the Main Distribution Frame (MDF) and Intermediate Distribution Frame (IDF) closets. In general the voice and data drops

specified herein home-run in the following fashion to:

6.1.5.3.1. Same voice and data (MDF and IDF) closets
6.1.5.3.2. Closets in the same building as the station drop location.

6.1.6. APPLICABLE DOCUMENTS

6.1.6.1. General: The following documents form a part of this section. In event of conflict between these reference documents and this section, the stricter requirement shall supersede.

6.2. Codes and Regulations: All work specified herein shall be in direct accordance with the following codes and regulations or most recent versions thereof:

6.2.1. Federal Communications Commission (FCC):
Title 47, Code of Federal Regulations, Part 68
Docket 88-57.
6.2.2. Local Codes and regulations:
City/County
State of South Dakota.
6.2.3. National Electrical Code (NEC):
Article 250: Grounding
Article 770: Optical Fiber Cable
Article 800: Communications Circuits.
6.2.4. Rural Electrification Administration (REA):
PE-90: Specification for Totally Filled Fiber Optic Cable
Section 801: Electrical Protection Fundamentals
Section 802: Electrical Protection Grounding Fundamentals
Section 817: Electrical Protection by Effective Grounding of Cable Sheaths
345-63 Acceptance test for telephone interference.

6.3. Standards: All work specified herein shall meet or exceed all requirements set forth in the following standards, or any more current revisions:

6.3.1. American National Standards Institute (ANSI):
6.3.2. C.8.47-1977: Polyolefin Insulated Thermoplastic Jacketed Communication Cables
6.3.3. ANSI/NFPA 70: National Electrical Code.
6.3.4. American Society of Testing Materials (ASTM):
6.3.5. D-3485-80: Smooth Wall Coilable Polyethylene Electrical Plastic Conduit.

6.3.6. Electronic Industries Association (EIA):
6.3.7. RS-354: Standard Colors for Identification and Coding
6.3.8. RS-455: Standard Test Procedure for Fiber Optic Communication Cables
6.3.9. EIA/TIA-310: Racks, Panels, and Associated Equipment
6.3.10. EIA/TIA-464: PBX Switching Equipment for Voiceband Applications
6.3.11. EIA/TIA 568/568B with current draft addendum at time of purchase, Specifications for Category 5e
6.3.12. EIA/TIA 568/568B with current draft addendum at time of purchase, Specifications for Category 6
6.3.13. EIA/TIA-569: Commercial Building Standard for Telecommunication Pathways and Spaces
6.3.14. EIA/TIA-606: Administrative Standard for the Telecommunications Infrastructure of Commercial Buildings
6.3.15. EIA/TIA-607: Commercial Building Grounding and Bonding Requirements for Telecommunications
6.3.16. EIA/TIA-TSB-36: Technical Systems Bulletin, Additional Cable Specifications for Unshielded Twisted Pair Cables
6.3.17. EIA/TIA-TSB-40: Technical Systems Bulletin, Additional Transmission Specifications for UTP Connecting Hardware.
6.3.18. EIA/TIA-TR-67: Latest Draft Revision
6.3.19. PN-3012: Fiber Optic Premises Cable Guide (Latest Draft).
6.3.20. National Electronic Manufacturer's Association (NEMA):

TC 9-1983: Smooth Wall Coilable Polyethylene Electrical Plastic Conduit
VE 1-1991: Metallic Cable Tray Systems.

6.3.21. Institute of Electrical and Electronics Engineers (IEEE):
802.3i Carrier Sense Multiple Access with Collision Detection (10Base-T Wiring Plant)

6.3.22. National Electrical Testing Association, Inc. (NETA):

6.3.23. Standard testing specifications.

6.3.24. Underwriters Laboratories, Inc. (UL):

6.3.24.1. All materials furnished, for which Underwriters Laboratories, Inc. standards have been established, shall be listed and bear the UL label or the listing label of an equivalent independent test laboratory.

6.3.24.2. All materials furnished, for which Underwriters Laboratories, Inc. standards have been established, shall be listed and bear the UL label or the listing label of an equivalent independent test laboratory.

6.3.24.3. UL 94 V-0 Burn Characteristics

6.3.24.4. UL 444: Standard for Safety, Communications Cables

6.3.24.5. UL 497: Standard for Safety, Protectors for Communications Circuits

6.3.24.6. UL 497A: Standard for Safety, Secondary Protectors for Communications Circuits

6.3.24.7. UL 497B: Standard for Safety, Protectors for Data Communications and Fire Alarm Circuits

6.3.24.8. UL 969: Standard for Marking and Labeling Systems

6.3.24.9. UL 1459: Standard for Safety, Telephone Equipment

6.3.24.10. UL 1863: Standard for Safety, Communications Circuit Accessories.

6.3.25. Occupational Safety and Health Administration (OSHA):

6.3.25.1. Latest edition with all amendments in effect as of the date of this specification.

6.3.26. American Society for Testing and Materials (ASTM):

6.3.26.1. Designations and standard testing specifications.

7. QUALITY ASSURANCE

7.1. Qualifications of Manufacturers and Fabricators: Equipment and material must be produced by manufacturers and fabricators regularly engaged in the manufacture of similar items and with a history of successful production acceptable to Telecommunications.

7.2. Qualifications of Contractor: Cabling Contractor shall have at the time of bid:

7.2.1. All State Licenses required for this Work.
7.2.2. Contractor must be able to provide the services required by the State.
7.2.3. Have a company that has been providing cable plant services for a minimum of three (3) years or have recent company experience providing cable plant services on a large campus and/or office complex environment with:
7.2.3.1. A LAN network consisting of at least two (2) buildings with a total of one hundred (100) networked PCs.
7.2.3.2. "A Centrex and/or PBX telephone system consisting of at least two (2) buildings with a total of one hundred (100) telephones (analog and ISDN).
7.2.3.3. Main telephone company communications cable feeding from street or right of way to a centrally located equipment room, all cable feeding the campus buildings running from that equipment room to those buildings.
7.2.4. Bidder must also be able to provide telephone and telephone line installation, termination, relocation, and repair. This will require technicians with a minimum of three (3) years training and/or experience installing, terminating, moving and repairing telephones and telephone lines, including Voice over IP (VoIP) technology.
7.2.5. Technicians shall be familiar with ISDN line technology and able to provide ISDN testing, servicing and technology.
7.2.6. Cabling Contractor shall be knowledgeable of and shall train and supervise its field personnel in a manner such that its field personnel shall perform all Work in direct accordance with all Occupational Safety and Health Administration (OSHA) regulations and local codes/regulations.

7.3. Qualifications of Installers: Contractor shall use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

7.3.1. Splicing. All splicing (fiber only) shall be undertaken only by Contractor personnel experienced in splicing the specific medium.

7.4. Daily Inspection: Contractor shall designate a single person to daily monitor all Work for purposes of assuring the Work performed is per the Specifications and Drawings, and that Work is performed at the highest standards of the trade.

7.5. No Field Changes: No changes shall be made in the field except by pre-approved (written) *Change Order or Field Order*, signed by BIT Telecommunications.

7.6. Field Alterations: On each State Work Authorization the State reserves the right to make minor alterations in the locations of terminal jacks and cable routing at any time prior to completion. Minor alterations shall be limited to previously designated rooms. All other alterations shall require a change order.

7.7. Products: Items of any classification which are used in quantity, such as jacks, modular punch down assemblies, and patch panels, shall in each case be the product of one manufacturer, new, and shall be used only for the services and duty level recommended by the manufacturer.

7.7.1. Manufacturer: Panduit or pre approved equivalent

7.8. Certified Test Data: Certified test data shall be delivered with specific equipment and materials, as required throughout this specification section. This certified test data shall indicate the test results the product has been subjected to, referencing the particular test standard used, and the results of that testing. All non-conforming equipment and materials shall not be delivered to the jobsite. Test results will be delivered to BIT Telecommunications as described in section 9 of the document.

7.9. Acceptance Inspection: All Work must pass all functional and visual performance standards for BIT Telecommunications to accept.

7.10. Payment: Payments shall be made only after all work is completed, inspected (if required) and accepted.

8. WARRANTY

8.1. System Performance Warranty: Contractor shall warrant to BIT Telecommunications that BWS shall perform in a manner consistent with this specification.

8.2. Materials and Workmanship Warranties: Contractor shall warrant to BIT Telecommunications that all materials and work furnished under this contract shall be new, of the latest design, of good quality, free of defects, and in conformance with the Contract Documents (including EIA/TIA Category Certifications for cables and termination components). All materials and work not in conformance with the Contract Documents and EIA/TIA Category Certifications for cables and termination components shall be replaced free-of-charge to BIT Telecommunications during the base-offer warranty period.

8.3. Base-Offer Warranty Period: The base-offer warranty period for the building wiring system shall be one (1) year, which shall start on the "date of Substantial Completion."

9. Submittals

9.1. Plan: Contractor's proposed installation plan shall include the complete installation and testing of the copper and fiber BWS. The IP shall satisfy all governing jurisdiction and specification requirements. Upon request Three (3) copies of the plan which shall include:

9.1.1.1. Detailed installation procedures and timetable
9.1.1.2. Project Testing Methodology and Plan.

9.1.2. **Installation Procedures**: The installation procedures shall indicate the detailed activities and schedule that Contractor shall undertake to complete the BWS.

9.1.3. **Project Test Plan:** Contractor shall submit a test plan that shall qualify compliance of the BWS, based on the technical requirements set forth in this document. The test procedure shall describe how the tests are to be performed, equipment utilized, schedule to be followed for all testing, and specific accept/reject criteria for each test. The test plan must be received, reviewed, and approved by BIT Telecommunications for compliance before any implementation shall be initiated. Test Plan scope shall be in accordance with this document.

9.1.4. **Shop Drawing Submittal:** Contractor shall provide complete shop (installation) drawings and a Bill of Materials. Three (3) copies of Shop drawings. No site work shall proceed prior to Contractor receiving reviewed Shop Drawings back from the State.

9.1.5. **Level of Detail:** The shop drawings shall provide complete documentation of the proposed work, and as a minimum shall include the following:
9.1.5.1.1. Legend of all schematic symbols, including all system design and component parameters utilized
9.1.5.1.2. Complete system schematic diagrams, including reference designators for all components, cable lengths
9.1.5.1.3. Installation details shall indicate equipment locations, cable routing, and all other specific location details, including cable pair allocation that are necessary for installation, testing, and maintenance

9.1.6. **Scope:** Shop drawings and manufacturer's data sheets are required for all major components including:
9.1.6.1. Cabling, riser, and station
9.1.6.2. Punch-down, cross-connect assemblies, and grounding details in the main distribution frame room (**MDF**) and intermediate distribution frame rooms (**IDF**)
9.1.6.3. Patch Panels, IDF
9.1.6.4. Station jacks in modular and walled offices.

9.1.7. **Preliminary Submittal:** Two (2) copies of preliminary BWS as-builds shall be submitted for Telecommunications review and approval. This submittal shall be concurrent with the cutover of the BWS to BIT Telecommunications. This drawing set shall reflect actual BWS *as-built* configuration, including the following:
9.1.7.1.1. All deviations from original shop drawings, such as quantity and description of items
9.1.7.1.2. Position of all cables and terminations, accurately dimensioned or scaled
9.1.7.1.3. Labeling scheme and identification of all labels
9.1.7.1.4. Configuration Tables in compliance with all labeling/inventory/record-keeping requirements of the most recent versions of EIA/TIA 606 and UL 969.

9.2. Final Submittals: Final submittal of all as-built drawings, BOM, and Configuration Tables must be received and approved by BIT Telecommunications before the work is considered to be complete. Upon Request, final project construction specifics shall be provided on:
9.2.1.1. Reproducible drawings
9.2.1.2. Electronic media:
9.2.1.2.1. Drawings: All electronic media will be transferred via method provided by BIT.
9.2.1.2.2. Bills of Material: CD-Rom, in "EXCEL" compatible spreadsheet format
9.2.1.2.3. Configuration Tables:

9.2.2. **As-Built Drawings**: One (1) set of **reproducible drawings** and in an approved file format of BWS as-builds shall be submitted, with BIT Telecommunications-directed changes. The electronic files shall have all "as-built" information, arranged to conform to BIT Telecommunication's CAD layering-scheme. This submittal shall be concurrent with final BWS acceptance by BIT Telecommunications. Specific layouts for building/entrance routes, MDF/IDF layouts, conduit pathways, and feed cable source/destination shall be included.

9.2.3. **As-Built Bills of Material and Configuration Tables**: Provide final BOM and configuration tables with "MS Excel" compatible spreadsheet format. Configuration Tables shall comply with all labeling/inventory/record-keeping requirements of the most recent versions of EIA/TIA 606 and UL 969. Include the following parameters in the spreadsheet; cable length, source/destination end points, cable manufacturer and part #, and end station equipment identifier.

9.2.4. **BWS Operating and Maintenance Manual**: Provide one (1) copy of a preliminary and two (2) copies of a final comprehensive BWS operations and maintenance (O&M) manual. This O&M manual shall include: applicable product data, parts lists, circuit diagrams and drawings.

9.3. Mandatory Final Submittals: Every work order will be documented and submitted to BIT Telecommunications.

9.3.1. **Cabling Diagrams**

9.3.1.1. Any new coppers or fiber cabling added to an existing or new location will require documentation of its location. The information will be delivered in form of a diagram or written description. The information shall contain:

9.3.1.1.1. Building location
9.3.1.1.2. MDF/IDF location within building. Example room number
9.3.1.1.3. Drop number as labeled on the patch panel and jack location
9.3.1.1.4. The location of jack. Described in such a way that anyone could find the jack.

9.3.1.2. Electronic documentation will be in Microsoft Visio, AutoCAD 2113 or newer, or other approved format. The file will be delivered to BIT Telecommunications by E-mail or other designated method at the time.

9.3.1.3. Whenever possible, a copy of a floor plan or an existing diagram will be provided by BIT Telecommunications. This document will be updated and returned upon completion of the work.

9.3.1.4. A copy of the jack location information will be left in MDF/IDF in an appropriate manner. Such as an envelope left at the rack or attached to the wall.

9.3.1.5. The contractor will not be responsible for existing cabling documentation.

9.3.2. **Fiber optic and copper cabling test results.**

9.3.2.1. All new Fiber, LAN and Telephone cable will require the test results to be submitted per section 12 of this document.

9.3.2.2. Test result will be set via E-Mail or other designated method by BIT Telecommunications.

9.3.2.3. Files will be in a format that can be viewed by BIT Telecommunications. File format will be a comma delimited (CSV) file. A Microsoft Word or Excel document will also be accepted.

10. Performance

10.1. Fiber Test Data: Contractor shall deliver test data of optical time domain reflectometer (**OTDR**) measurements taken on all optical fibers as described in section 9 of this document.

10.2. Copper Test Data: Contractor shall deliver test data of all copper BWS element measurements as described in section 9 of the document.

10.3. JOB-SITE PRINTS: As required by individual project.

10.3.1. **General:** Contractor shall keep a complete set of construction drawings at the jobsite at all times.

10.3.2. **Frequency of Updating.** This drawing set shall be **updated each day** with any changes in the work, and shall be made available for BIT Telecommunications to review as requested.

10.4. FIRE-STOP REQUIREMENTS:

10.4.1. **General:** Local code-approved fire-stop means shall be applied at each interface between floors and between all fire-rated spaces.

10.4.2. **Cable Tray/Ladder Penetrations:** Pillow type firestop material shall be used for cable tray/Ladder penetrations.

10.4.3. **Wall and Floor Penetrations:** Putty/sleeve type firestop shall be used for wall and floor penetrations.

10.4.4. **Inspection Requirements:** All necessary shop drawings, showing fire-stop means and materials, shall be developed by Contractor as required by site inspection officials.

10.5. BWS PERFORMANCE CRITERIA

10.5.1. **Copper Station-Cable**: All copper (voice/data/video) station-cabling shall comply with all physical and functional requirements of their designated EIA/TIA Category Level (e.g., 5) and with Cable Specifications 17931 and 17932. Compliance shall be shown in the following parameters:

10.5.1.1. 100% operating pair-count (no non-operational, non-compliant pairs)

10.5.1.2. Conformity with cable specifications.

10.5.1.3. **Copper Riser Cable:** All copper riser-cable systems shall be in accordance with ANSI/NFPA-70, Article 800. All work shall accomplish the following:

10.5.1.3.1. 99.5% operating pair-count.

10.5.1.3.2. Conformity with cable specifications.

10.5.1.4. **Copper Plenum Cable:** All cables deployed in plenum spaces shall be in accordance with ANSI/NFPA-70, Article 800.

10.5.1.5. **Copper Cross-Connect Wire/Cables:** All copper cross-connect wire and cables shall be in accordance with ANSI/NFPA-70, Article 800.

10.6. BWS STATION CONNECTIVITY REQUIREMENTS

10.6.1. **General:** All station locations shall be cabled with the specific connectivities as marked on the specific project drawings. All station cables shall home-run to their respective IDF closet. Specific IDF closet locations shall be coordinated between Contractor and BIT Telecommunications. All station connectivities shall be served with separate cables. All stations (unless otherwise identified) shall have the following voice and data connectivities:

USAGE	PAIRS	TYPE/CAT.	AWG	RJ	COLOR CODE	LABEL
Voice 10T/100T/Gigabit-Ethernet	4 4	UTP/5e UTP/5e	24 24	45 45	**white=voice** **blue=data**	VOICE-1& -2 DATA-1 & -2

10.6.2. **STATION DROP NUMBERING SYSTEM**

10.6.2.1. **General:** All station drops (voice and data) shall be numbered as follows or as directed by the Telecommunications Coordinator:
Number Format: CC#-BB#-TC#-T-XXX
Where:
CC# is the campus number, 2-digit field – when applicable
BB# is the building number, 2-digit field – when applicable
TC# is the voice and / or data communications closet, e.g., 2-digit field – when applicable
T is to differentiate between a "T" telephone line and a "L" LAN/data line. 1 digit "T" or "L"
XXX is a unique station-drop number, assigned by the Telecommunications Coordinator that is applied **sequentially** at both the station jack, and either MDF/IDF punch-down blocks or the MDF/IDF patch-panels.

10.6.2.2. **Standards:** Compliance to all labeling requirements of most recent EIA/TIA 606 and UL 969.

10.6.3. **BWS BACKBOARD CABLE PUNCH-DOWN BLOCK COLOR-CODE**

10.6.3.1. **General:** All BWS backboard (MDF & IDF Punch-Block Designator-Color) standard color-codes shall be as follows or as directed by the Telecommunications Coordinator:

COLOR	FUNCTION
Blue	Horizontal cables to/from stations
Green	Cables on customer side of demarcation point
Orange	Cables to/from equipment located in MDF/IDF
Purple	Cables to/from common (PBX) equipment
Red	Cables to/from key station equipment
White	Backbone cables to/from MDF cross-connects
Gray	Backbone cables to/from IDF cross-connects
Yellow	Cables to/from auxiliary circuits & special equipment (e.g., hub out-of-band monitoring, security, EMS, etc.).

10.6.4. **BWS STANDARD 4-PAIR PIN-OUT SCHEDULE**

10.6.4.1. **Data Pin-out Schedule:** All data station jacks shall be wired per the ***EIA/TIA 568B*** pin-out standard. All eight (8) conductors of each data cable shall be connected at a separate station RJ-45 (8P8C) jack.

10.6.4.2. **Voice Pin-out Schedule:** Voice pin-out will in most cases be ***EIA/TIA 568B*** Standard, as approved by the Telecommunications Coordinator. *Contractor shall confirm actual voice pin-out with the Telecommunications Coordinator prior to Work.*

10.6.4.3. **USOC Jack Wiring Scheme: Expressly not acceptable as a data jack wiring scheme.** All eight (8) conductors of each station cable (IDF/MDF end) shall be terminated into patch panels with "AT&T 110" style insulation displacement connectors at the IDF/MDF.

10.6.5. **CROSS-CONNECT WIRE COLOR-CODE**

10.6.5.1. General**:** All cross-connect wire shall adhere to the following color-code unless direct otherwise by the Telecommunications Coordinator:

COLOR	FUNCTION
Blue/White	Analog voice cross-connections
White/Red	Data voice cross-connections
Blue/Yellow	Carrier voice cross-connections (including pay-phones)

11. BWS PRODUCTS

11.1. Requirements: All products shall meet all Standards, Code, and Regulation requirements set forth in these standards. All products shall comply with the labeling requirements of EIA/TIA 606 and UL 969.

11.2. RACEWAYS

11.2.1. **Raceways and Sleeves:** All raceways and sleeves, except as noted herein, shall be provided by Electrical Contractor per ANSI/IEEE 70 (National Electrical Code) as shown on the project Drawings. Contractor shall coordinate with Electrical Contractor.

11.3. CABLING

11.3.1. Cables: All copper cables shall be per *Specification 17932*, EIA/TIA-TSB-36: UTP Cable Specifications (as applicable), and the Project Drawings. All voice and data station cable shall bear the UL certification for its respective EIA/TIA Category. All station connectivities shall be provided in separate cables for each type of connectivity required.

11.4. VOICE TERMINATION HARDWARE

11.4.1. General Termination Requirements **(non-upgrading)**
- 11.4.1.1. Punch down Assemblies: Complete 110 punch-down assemblies; include designation strip kit (AT&T 110). Colors (GREEN, BLUE) shall be per part 1 of this specification section.
- 11.4.1.2. In locations where 66 blocks is already used, 66 blocks shall continue to be used.
- 11.4.1.3. Include: Shall include wire management means (D-rings, brackets, etc.), vertical and horizontal
- 11.4.1.4. Labeling: Comply with all labeling requirements of EIA/TIA 606 and UL 969.

11.4.2. Voice Building-to-Building/Lateral/Riser Cable Termination Hardware: Voice building-to-building cables, lateral cables, and riser cables (24 AWG) shall be terminated with horizontal and vertical wire management at the:
- 11.4.2.1. TELCO Demarc/MPOP, MDF, and IDFs via:
  - 11.4.2.1.1. 110 (100 pair or 300 pair) punch-down blocks
  - 11.4.2.1.2. 110 connecting blocks , horizontal and vertical wire management brackets
  - 11.4.2.1.3. With cross-connect capabilities, **fully cross-connected**
  - 11.4.2.1.4. Quantity of Voice Building-to-Building/Lateral/Riser Cable Termination Hardware shall be as required to fully cross-connect all related cables.

11.4.3. Telco Demarc: Mount all voice termination hardware on grounded, wall-mounted blocks.

11.4.4. MPOP**:** Mount all voice termination hardware on grounded, wall-mounted stand-offs by same mfgr as punch-down blocks.

11.4.5. MDF**:** Mount all voice termination hardware on grounded, wall-mounted stand-offs by same mfgr as punch-down blocks.

11.4.6. IDF**:** Mount all voice termination hardware on grounded, wall-mounted stand-offs by same mfgr as punch-down blocks.

11.4.7. Voice Station Cable Termination Hardware**:** Voice station cables (4-pr, 24 AWG, UTP) shall be terminated as follows:
- 11.4.7.1. MDF/IDF via:
  - 11.4.7.1.1. 110 (100 pair or 300 pair) punch-down blocks
  - 11.4.7.1.2. 110 connecting block assemblies
  - 11.4.7.1.3. With cross-connect capabilities, fully cross-connected
  - 11.4.7.1.4. Quantity of MDF/IDF termination hardware shall be sufficient to fully populate their respective served areas at 100 square feet per station.

11.4.8. Stations via:
11.4.8.1. RJ45 Panduit jacks or pre approved equivalent applicable section.
11.4.8.2. Each 4-pr voice station cable shall be terminated into one RJ45 jack

11.5. DATA TERMINATION HARDWARE

11.5.1. **General Termination Hardware Requirements:** All data terminations shall adhere to the following:
11.5.1.1. Characteristics:
11.5.1.1.1. Equal to or exceed functional requirements of (fully compliant with) EIA/TIA Category-5e/6, as tested/certified by UL
11.5.1.1.2. Equal to or exceed requirements of EIA/TIA-TSB-36/40/67: UTP Connecting Hardware Specification, Category-5e/6.
11.5.1.1.3. Compliance to all labeling requirements set forth in section 10.

11.5.1.2. All MDF/IDF terminations shall include:
11.5.1.2.1. Designation strip kit (AT&T, or equivalent). Colors shall be coordinated with the station color codes
11.5.1.2.2. Wire management means (D-rings, brackets, etc.), vertical and horizontal.

11.5.2. Copper Data Building-to-Building, Riser, and Tie Cable Termination Hardware. Data building-to-building, lateral, and riser cables (24 AWG) shall be terminated at the:
11.5.2.1. Data MDF/IDF via Category-5e/6 patch panels with Panduit modular patch panel.
11.5.2.2. Pin-Outs:
11.5.2.2.1. pairs shall be pinned-out to each RJ45 connector in the MDF/IDF Category-5e/6 patch panels
11.5.2.2.2. Conductor pin-outs shall be per specifications.
11.5.2.3. Pairs shall be consecutively labeled at each end (MDF and IDF).

11.5.3. Copper Data Station Cable MDF/IDF Termination Hardware. Copper data station cables (4-pr, 24-AWG, UTP) shall be terminated on racks in the MDF/IDFs as follows:
11.5.3.1. DATA MDF/IDF on Category-5e/6 patch panels with Panduit modular patch panel.
11.5.3.2. Quantity of MDF/IDF station cable termination hardware shall be sufficient to fully populate their respective floors/areas at 100 square feet per station.
11.5.3.3. Copper Data Station Cable patch panels shall be separate (but physically adjacent to) all associated Building-to-Building and Riser patch panels.

11.5.4. Copper Data Station Cable Station-end Termination Hardware. Copper data station cables shall terminate via RJ45 sockets.

11.6. UNIVERSAL WORKSTATION OUTLET

11.6.1. General: All station connectivities shall terminate at the station in one (1) universal workstation outlet (UWO). UWO color shall adjacent electrical receptacle cover (or provide color as specified by the BIT Telecommunications Coordinator). Provide and install blank plastic faceplates (single/double-gang, matching voice/electrical faceplate color) at all station outlets (e.g., mud-rings or J-boxes) not used for data/voice connectivity. All data/voice outlets shall be located per ADA standards. Contractor shall coordinate all ADA issues with site construction manager.

11.6.2. UWO Physical Configurations: UWO's shall be configured for wall mount, modular furniture mount, or floor mount, as follows:
11.6.2.1. Wall mount UWO:
11.6.2.1.1. Single-gang
11.6.2.1.2. Flush mount.
11.6.2.2. Modular furniture mount UWO:
11.6.2.2.1. Surface mount
11.6.2.2.2. Front access
11.6.2.2.3. Provide with mounting bracket for specific modular furniture.
11.6.2.3. Floor mount UWO:
11.6.2.3.1. Single-gang or double-gang
11.6.2.3.2. Flush mount.

11.6.3. UWO's shall have the following functional characteristics:

Qty of separate connectivity positions:	2, 4 or 6 as required
Available (interchangeable) sockets:	RJ-11, RJ-45, LC, SC, F
Copper termination type:	Panduit or pre approved equivalent, color coded
Connectivity color coding:	Yes, front-side, per section 1.11
Connectivity-markings:	Yes, front-side, permanent, legible, typed
Pin-Out physical configuration:	Voice at top, video at center (optional) data at bottom

11.6.4. UWO Manufacturers: The following manufacturers are examples of desired UWO requirements:

Wall (single-gang flush) mount UWO:	Panduit or pre approved equivalent
Modular furniture (surface mount) UWO:	Panduit or pre approved equivalent

11.7. PROTECTORS

11.7.1. Outside Plant Copper Cabling Primary Surge Protectors: Primary surge protectors shall be provided and installed at each termination (end) of all outside plant copper cabling. These protectors shall meet or exceed the requirements of ANSI/NFPA 70, EIA/TIA 571, and UL 497/497A. Primary surge protector maximum let-through voltage shall be less than the maximum allowed for the State's voice switch and data equipment.

11.7.1.1. Quantity of protectors shall be as required to protect each pair of all TELCO/Building-to-Building cable, at each building entry point.

11.7.1.2. Protector terminal block shall be ATT 188B1-100 or equivalent.

11.7.1.3. Plug-in protectors shall be ATT 3C1S, or equivalent.

11.8. CABLE TIES

11.8.1. Riser**/** Plenum rated cable ties shall be used throughout the Work.

11.8.2. Velcro ® style cable ties shall be used for all MDF/IDF horizontal cable bundling

11.8.3. Manufacturer:

11.8.3.1. Panduit

11.8.3.2. 3M or equivalent.

11.9. "D" RINGS

11.9.1. "D" rings shall be **metal**, sized for application with 80% fill max.

11.9.2. Use “D” ring only in MDF or IDF at a max of 12” increments.

11.9.3. Manufacturer:

11.9.3.1. ATT 13"X" series (2”, 4”, 6”) or equivalent.

11.10. CABLE BONDING SHIELD

11.10.1. Cable bonding shields shall be capable of attaching copper cables to local grounding means, as required by ANSI/IEEE 70 (National Electrical Code).

11.10.2. Manufacturers:

11.10.2.1. 3M Scotchlock series 4460 or equivalent.

11.10.3. Properly sized cable bonding shields shall be provided and installed at all termination points for all copper:

11.10.3.1.1. Building-to-building cables

11.10.3.1.2. Lateral cables

11.10.3.1.3. Riser cables.

11.11. EQUIPMENT RACKS/CABINETS (Unless otherwise specified)

11.11.1. **MDF/IDF Floor Racks:** EIA 19" wide, 7' tall, racks shall be supplied and installed in each MDF by Contractor. Since the exact configuration of each MDF/IDF will vary, racks shall be installed per Telecommunications reviewed shop drawings that are specific to each MDF/IDF. MDF/IDF racks shall be fabricated from clear finished, 6061 aluminum alloy, with EIA/TIA standard 19" drilled and tapped hole pattern, self-supporting. Each rack shall be grounded per NEC requirements for electrical equipment housings. All racks shall be physically secured via anchoring to the sub-flooring.

11.11.2. **MDF/IDF Wall Rack:** When space limitations require that a wall mounted rack be used

rather than floor racks, provide and install one (1) each equipment wall rack per MDF/IDF, according to BIT Telecommunications reviewed shop drawings.

11.11.3. **Wall Rack Construction.** MDF/IDF racks shall be fabricated from clear finished, 6061 aluminum alloy or steel construction, with EIA/TIA standard 19" drilled and tapped hole pattern, self-supporting. Racks must be 18" deep swing away type. Height can be 24", 36" or 48" depending on application.

11.11.4. **Interior Cabinet Construction:** MDF/IDF cabinets shall be a sectional, wall mount type, constructed to NEMA 1 standards with baked enamel finish and lockable door. Cabinet shall have standard EIA 19" vertical mounting members (drilled and tapped holes) with a minimum of 15" dept. Height shall be as required for the application, with a minimum of 30." Construction shall allow for venting of heat generated by internal electronic equipment, knock-outs top and bottom, and a "swing-out" design such that connections at rear of electronic equipment can be accessed. Locks on all cabinets shall have the same key. Cabinets shall be CPI model 11685-219 w/ fan or equivalent.

11.11.5. **Exterior Cabinet Construction:** OSP cabinets shall be pedestal type, constructed to NEMA 3R standards with baked enamel finish and lockable door. Cabinet shall have standard EIA 19" vertical mounting members (drilled and tapped holes) with a minimum of 15" dept. Height shall be as required for the application, with a minimum of 30." Construction shall allow for venting of heat generated by internal electronic equipment and a "swing-out" design such that connections at rear of electronic equipment can be accessed. Locks on all cabinets shall have the same key. Cabinets shall be CPI or equivalent, w/ fan.

11.12. EQUIPMENT SHELVES

11.12.1. **MDF/IDF Equipment Shelves:** Unit pricing shall be provided for equipment shelves installed.

11.12.2. **Shelve Construction:** MDF/IDF shelves shall be constructed from 0.090" thick aluminum (minimum) with 15" by 19" minimum usable surface, and be capable of 50 pound loading. Shelves shall be CPI part # 40074-100 or equivalent.

11.12.3. **Shelve Installation:** All racks shall be provided with (1) rack mounted shelf.

11.13. PATCH CORDS

11.13.1. **General:**
- 11.13.1.1. **Compliance:** Compliance to all labeling requirements of the most recentEIA/TIA 606 and UL 969 standards.
- 11.13.1.2. **Certifications:** Tested and certified to EIA/TIA Category-5e/6 requirements.
- 11.13.1.3. **Quantities:** Patch cord quantities shall be as required by the BIT Telecommunications Coordinator. Unit pricing shall be provided for patch cords delivered to job-site.

11.13.2. **Requirements**
- 11.13.2.1. Length: Length of patch cords shall be:
  - 11.13.2.1.1. Sufficiently long to provide proper connectivity
  - 11.13.2.1.2. Uniform for each type of application
  - 11.13.2.1.3. Actual lengths shall be jointly determined by BIT Telecommunications and Contractor
- 11.13.2.2. Color Coded:
  - 11.13.2.2.1. Each application shall have a different color patch cord
  - 11.13.2.2.2. Color selection shall be jointly determined by BIT Telecommunications and Contractor
- 11.13.2.3. Labeled:
  - 11.13.2.3.1. Each patch cord shall be labeled with the length of the patch cord within at least 3" of one end of the cable
  - 11.13.2.3.2. Label construction shall be as specified here in
- 11.13.2.4. Functional Characteristics:
  - 11.13.2.4.1. Equal to or exceed functional requirements of specific protocol(s) intended for

use
11.13.2.4.2. Equal to or exceed requirements of section 17932
11.13.2.4.3. Factory made-up, tested, and certified for EIA/TIA Category-5e/6.

11.13.3. **Voice Patch Cords, Station and IDF:** Patch cord quantities shall be as required by BIT Telecommunications. All voice IDF/Telco room punch-down blocks shall be fully cross-connected via cross-connect wire per section 17932.

11.13.4. **Data Patch Cords, Station:** The following station data patch cords shall be available from the Contractor:

Connectivity	Connector #1	Connector #2	Length (Ft)
10T/100T/Gigabit-Ethernet	RJ 45	RJ 45	15 (Max.)

11.13.5. **Data Patch Cords, IDF/MDF.** Pin-outs for all IDF patch cords shall be "straight-through." The following IDF/MDF data patch cords shall be available from the Contractor:

Connectivity	Connector #1	Connector #2	Length (Ft)
10T/100T/Gigabit-Ethernet	RJ 45	RJ 45	15 (Max.)

11.13.6. **Patch Cable Color**
11.13.6.1. Wiring closet Data patch cables will be black
11.13.6.2. Wiring closet VoIP patch cables will be red
11.13.6.3. Work station patch cables will be grey
11.13.6.4. Firewall systems will be green
11.13.6.5. Access Points will be white
11.13.6.6. Crossover cables will be yellow. NO OTHER PATCH CABLE WILL BE YELLOW IN COLOR OTHER THAN CROSSOVER.
11.13.6.7. Camera and door access systems will be purple
11.13.6.8. Door security will be orange.

11.13.7. **Twisted Pair Copper Flag Markers**
11.13.7.1. Contractor shall provide flag markers to identify all binder groups within indoor entrance splices.

11.13.8. **Manufacturers:** Acceptable manufacturers are:
11.13.8.1.1. Panduit, Pan Ty #PLF1M-C
11.13.8.1.2. Or functional equivalent.

11.14. Fiberoptic Fan-Out Kits

11.14.1. **General:** Contractor shall provide fiberoptic cabling fan-out kits at all riser fiber cable terminations.
11.14.1.1. **Manufacturers:** Acceptable manufacturers are:
11.14.1.1.1. Siecor fan-out kits
11.14.1.1.2. Or functional equivalent.

11.15. Vertical Wire Management

11.15.1. **General:** Contractor shall provide vertical wire management each side of all racks.
11.15.2. **Manufacturers:** Acceptable manufacturers are Panduit or pre approved equivalent.
11.15.3. **See Appendix A for a sample rack configuration.**

11.16. Horizontal Wire Management

11.16.1. **General:** Contractor shall provide horizontal wire management at 48-port intervals on all racks with patch panels.
11.16.2. **Manufacturers:** Acceptable manufacturers are Panduit or pre approved equivalent.
11.16.3. **See Appendix A for a sample rack configuration.**

11.17. CONDUIT BUSHINGS

11.17.1. **General:** All conduit and sleeve insulating end bushings shall be UL approved.
11.17.1.1. **Quantity:** Contractor is responsible for inspecting all conduits and sleeves prior to

cable pulling and fitting insulating end bushings on all conduits and sleeve ends that are not so equipped.

11.18. CABLE LABELS.

11.18.1. **General:** Permanent, legible, cable labels shall be provided and installed at the BWS cabling points identified within this specification, including each-end of all riser, lateral, station, and patch cables. All cable labels shall comply with the labeling requirements of the most recent EIA/TIA 606 and UL 969 standards.

11.18.2. **Types:** Acceptable cable label types are:
- 11.18.2.1.1. Shrink wrap
- 11.18.2.1.2. Pre-Approved equivalents.

11.18.3. **Manufacturers:** Acceptable cable label manufacturers are:
- 11.18.3.1. Brady
- 11.18.3.2. 3M.

11.19. FIBEROPTIC CABLING:

11.19.1. **General:** All fiberoptic cabling shall be per specifications for the specific use required.

11.19.1.1. **Quantity:** Fiberoptic cabling quantities and lengths shall be as required by BIT Telecommunications.

11.19.2. **FIBEROPTIC CABLING TERMINATION HARDWARE**

11.19.2.1. **Fiberoptic connectors:** Connectors shall be **LC** type with the following characteristics:

11.19.2.1.1. **Loss:** Mated pair loss (without rotational optimization) shall not exceed:
- 1.5 dB maximum for multimode cable at 850 nm.
- 1.5 dB maximum for multimode cable at 1300 nm.
- 0.5 dB maximum for single mode cable at 850 nm.
- 0.5 dB maximum for single mode cable at 1300 nm.

11.19.2.2. **Pull Strength:** Pull strength between connectors and attached fiber shall be 50 lbs minimum.

11.19.2.3. **Types:** Acceptable types are:
- 11.19.2.3.1. Fused pig-tails w/ factory installed connectors
- 11.19.2.3.2. Mechanical
- 11.19.2.3.3. Pre-Approved equivalents.

11.19.3. **Manufacturers:** Acceptable manufacturers are:
- 11.19.3.1. ATT
- 11.19.3.2. Siecor
- 11.19.3.3. Or equivalent.

11.19.4. **FIBER OPTIC PATCH PANELS**

11.19.4.1. **General:** All fiberoptic cables entering each termination room (e.g., MDF, IDFs), shall terminate on fiberoptic patch panels. Fiber optic patch panels and associated hardware shall:
- 11.19.4.1.1. Provide an integrated connector panel
- 11.19.4.1.2. Provide a splice shelf for storage of 20 feet of fiber
- 11.19.4.1.3. Accept all major connector types (ST, SC, LC, and MIC)
- 11.19.4.1.4. Provide a splice cradle that will accept fusion or mechanical splices
- 11.19.4.1.5. Allow top and bottom cable entry
- 11.19.4.1.6. Mount on an industry standard EIA 19" rack or wall
- 11.19.4.1.7. Provide power and signal grounding capability per the NEC
- 11.19.4.1.8. Be suitable for terminating, interconnecting, splicing and testing

11.19.4.2. **Types:** Acceptable types are:
- 11.19.4.2.1. Painted, aluminum
- 11.19.4.2.2. Pre-Approved equivalents.

11.19.4.3. **Manufacturers:** Acceptable manufacturers are:
11.19.4.3.1. Connector panel housings
11.19.4.3.1.1. Siecor CPH-072, or equivalent
11.19.4.3.2. Multimode connector panels
11.19.4.3.2.1. Siecor FDC-CP1P-57, or equivalent
11.19.4.3.3. Single mode connector panels
11.19.4.3.3.1. Siecor FDC-CP1P-59, or equivalent

11.20. POWER POLES.

11.20.1. **General:** All power poles shall be UL listed, with a minimum of two (2) shielded cavities which run the entire length of the power poles. Pre-punched knock-outs shall be provided near the bottom of each power pole (per ADA requirements).

11.20.2. **Types:** Acceptable types are:
11.20.2.1. Painted, aluminum extrusions
11.20.2.2. Pre-Approved equivalents.

11.20.3. **Manufacturers:** Acceptable manufacturers are:
11.20.3.1. Wiremold Series 30TP2V
11.20.3.2. Or equivalent.

11.21. POKE-THROUGHS

11.21.1. **General:** All poke-throughs shall be UL listed as a minimum of 2-hour fire-stop, and have a minimum of one (1) ¾" opening for BWS wiring to penetrate through the fire-stopped assembly. Actual fire-stop rating shall be equal to the rating of the floor in which the particular fire-stop is utilized.

11.21.2. **Types:** Acceptable types are:
11.21.2.1. All UL listed poke-throughs.

11.22. SURFACE-MOUNTED RACEWAYS

11.22.1. **General:** Surface-mounted raceways shall be designed and manufactured specifically for BWS applications and shall be UL listed for that purpose.
11.22.2. **Types:** Acceptable cable label types are:
11.22.2.1. Metallic
11.22.2.2. Non-metallic.

11.22.3. **Manufacturers:** Acceptable manufacturers are:
11.22.3.1. Panduit, Type LD
11.22.3.2. Wiremold, Uni-duct series

11.23. SPLICE CASES

11.23.1. **General:** Contractor shall provide splice cases for all indoor entrance splices
11.23.2. **Manufacturers:** Acceptable manufacturers are:
11.23.2.1. AT&T, Type 2000FR
11.23.2.2. Or functional equivalent.

12. BWS IMPLEMENTATION

12.1. General: Contractor shall assure that all voice copper station cables will result in a complete and complementary interface with the existing voice switching system, and have cross-connect capability. Contractor shall assure that all data copper work will result in a complete and compliant EIA/TIA 568 Category-5e/6 station cabling system. Contractor shall assure that all fiber work will result in a complete and complimentary fiber cabling system for associated opto-electronic equipment having a **4 dB power budget**.

12.2. SAFETY

12.2.1. **Safety Issues:** Contractor and BIT Telecommunications shall adhere to all applicable health, safety, and environmental laws, rules, and regulations, including the Occupational Safety and Health Administration (OSHA) Rules and Regulations (hereafter referred to as Safety Regulations). BIT Telecommunications does not contemplate nor include as an undertaking of Contractor, unless specified in writing, work in any area where a hazardous substance is present. Hazardous substance means any substance regulated by any Safety Regulation and includes, but is not limited to, asbestos in either a friable or non-friable condition. Contractor shall cease all operations in any area where the existence of a hazardous substance is encountered, and shall immediately notify BIT Telecommunications in writing. Contractor shall not re-initiate work in or around identified hazardous substance areas prior to receiving written permission from BIT Telecommunications. All safety issues relating to hazardous substances shall be solely administered between BIT Telecommunications and Contractor. It is solely Contractor's responsibility to assure that all installation personnel are familiar with safety procedures, identification of hazardous substances, and proper operation of related equipment.

12.3. EXECUTION

12.3.1. **General:** All work described in this section shall be performed in direct accordance with all Occupational Safety and Health Administration (OSHA) regulations and local codes/regulations.

12.4. CABLE ROUTING:

12.4.1. All media shall be routed as follows:

12.4.1.1. **Vertical Runs:** All riser cables shall run parallel to the riser system.

12.4.1.2. **Horizontal Runs:** All horizontal bundles of cable shall run parallel or perpendicular to the walls.

12.5. INSPECTION AND COORDINATION

12.5.1. **Site Conditions:** Examine the areas and conditions under which work of this section will be installed. Verify that work of other trades is sufficiently complete and in the proper condition to receive the work of this section. In the event of discrepancies, immediately notify BIT Telecommunications. BIT Telecommunications will be responsible for:

12.5.1.1. Providing access to workstation jack locations (i.e., moving existing user materials, storage containers, etc.)

12.5.1.2. Powering-down and logging-out existing user devices from their host equipment prior to new station drops being deployed (Contractor shall physically de-link user devices)

12.5.1.3. Defining specific areas in each MDF/IDF that are available for mounting Contractor supplied items

12.5.1.4. Providing cross-references for specific workstation connectivity's to existing BIT Telecommunications host/network equipment (port numbers, etc.).

12.6. Site Coordination: Coordinate with BIT Telecommunications personnel, **Manufacturers:** and other contractor personnel as required to assure proper and adequate provisions for the Work.

12.7. Exact Location of Station Drops: Contractor shall verify locations of all station outlets and related connections prior to installation. BIT Telecommunications reserves the right to make reasonable changes in the locations (up to 10'-0") of station outlets. Such changes shall be made

at no additional cost to BIT Telecommunications.

12.8. BWS INSTALLATION

12.8.1. **General:** BWS media shall be installed as indicated on reviewed shop-drawings, and as provided for in this specification, with referenced documents.

12.8.2. **Accessibility**: All components and assemblies, etc., shall be installed so as to be readily accessible for the operation, servicing, maintaining, and repairing of related communication system elements. Items installed in unsuitable locations shall be removed and relocated as directed by BIT Telecommunications, at no change in contract time or amount. All code required clearances shall be maintained with respect to adjacent electrical equipment and housings.

12.8.3. **Identification of Components:** All BWS wiring, interconnect points, cabinets, enclosures, and other apparatus shall be properly and completely identified by means of neatly installed machine-printed identification nameplates. See section 1 for required color coding and station numbering schemes.

12.8.4. **Excess Raceway (Conduit, Etc.) Fill Volume:** If situations occur where larger cross-sections of station drop cables are required than the installed raceways will accommodate, then Contractor shall route excess station cable(s) adjacent to existing raceways. Where station cable(s) adjacent to existing raceways cross fire-rated barriers, fire-stop shall be provided at all such fire-rated barriers. Coordinate with BIT Telecommunications prior to performing this type of work.

12.8.5. **Acceptable Spacing:** All BWS shall have the following minimum separations (per EIA/TIA 570) from the following types of conductors:

APPLICATION	TYPE OF CONDUCTOR INVOLVED	MINIMUM SEPARATION
Electrical Distribution	Bare (no insulation) power wiring and Service Entrances	5 feet
Electrical Distribution	Open (no metallic raceway) power wiring, < 300 Vac	2 inches
Electrical Distribution	Power wiring in grounded metallic raceway	1 inch
Electrical Distribution	Power wiring in grounded metallic conduit	1 inch
Radio & TV	Antenna lead and ground wires, without grounded shield	4 inches
Signal/Control Wires	Open high-frequency wiring, not over 300 Vac	1 inch
CATV Cables	Community TV system coaxial cables w/ grounded shield	None
Telephone Service Drop	Aerial or buried	2 inches
Signage	Neon signs and associated wiring from HF transformer	6 inches
Lightning System Components	Lightning rods, down conductors, etc	6 feet
60 Hz Power Transformer	Power wiring in grounded metallic enclosures, < 600 Vac	2 feet

12.9. Cable Labels and Pathway Markers

12.9.1. General requirements
- 12.9.1.1. Each cable shall be **labeled at each end** that is terminated in MDF/IDF closet
- 12.9.1.2. Labels shall be unique numbers that conform to the BWS labeling system
- 12.9.1.3. Label construction shall be as specified here in Section 10 of the specification
- 12.9.1.4. Label information shall be confirmed with Telecommunications prior to labeling of cables
- 12.9.1.5. Handwritten labels are not acceptable.

12.10. Riser and OSP Fiberoptic Cabling Labeling

12.10.1. Contractor shall label each individual fiber 3-inches from the ST/SC/MIC connector with a **Panduit #PMDR-0-9 GMM** polyester film marker tape (or functional equivalent) as a “flag,” designated in numerical sequence starting with fiber-1.

12.10.2. Contractor shall furnish and install an **Osburn Associates FO4002** 1-3/4-inch by 3-inch fiber optic caution flag (or functional equivalent) every 4 feet on any innerduct exposed between entrance and equipment rack.

12.10.3. Contractor shall label the front of each fiber distribution center with the label furnished with such housing, using Telecommunications approved scheme.

12.11. Labeling within and on Splice Cases: Contractor shall identify all binder groups utilizing color-coded zip ties and labeling the plant pair count for each binder group utilizing flag markers. Contractor shall furnish and install stamped metal band labels on all OSP and riser cables indicating cable size, gauge, and plant pair count. Contractor shall label splice cases using 2-inch letters with machine-produced black typeface on an orange background.

12.12. OSP Pathway Markers

12.12.1. Provide marker tape in designated duct pathway from property line entrance to MPOP location for US West Service (or CLEC service).

12.12.2. Provide marker tape in designated duct pathways from each building MDF to MPOP.

12.13. COPPER PAIR CABLE INSTALLATION

12.13.1. **Precautions:** Contractor shall practice the following precautions throughout the deployment of this work:

12.13.1.1. Cable installation personnel shall be familiar with safety procedures, equipment operation, and the cable manufacturer's installation requirements such as maximum pulling tensions

12.13.1.2. Cable shall be pulled with a pulling-eye of the type that is recommended by the cable manufacturer, as required

12.13.1.3. Pull-throughs with offsets shall be rigged with two (2) sheaves, as required.

12.13.1.4. **Racking:** Contractor shall practice the following racking related approaches throughout the deployment of this work:

12.13.1.4.1. In long pull-throughs racking, slack shall be obtained by the use of bending shoes or equivalent to avoid sheath damage

12.13.1.4.2. Cable shall be secured in a neat and organized manner with plastic tie-wraps

12.13.1.4.3. Excess cable in splicing cable vaults shall be neatly coiled for storage prior to splicing

12.13.1.4.4. After splicing is completed, splice cases shall be properly secured to racks with plastic tie-wraps.

12.13.2. **Pulling Methods:** Pulling methods, and all associated equipment required, shall be consistent with the cable manufacturer's recommendations, and shall be approved by Telecommunications prior to the start of the installation operations. The following installation related approaches shall be practiced:

12.13.2.1. Cable pulling-lubricant shall be used as required and shall be acceptable to the cable manufacturer and Telecommunications.

12.13.2.2. The manufacturer's pulling tension limitations shall not be exceeded under any circumstances.

12.13.3. **Splicing:** No copper splicing shall be allowed within the BWS.

12.13.4. **Copper Data Pair Terminations**

12.13.4.1. All pairs shall be terminated on Panduit modular jacks, by methods prescribed for EIA/TIA 568 Category-5e/6 (10-40G) performance in:

12.13.4.2. EIA/TIA 568

12.13.4.3. EIA/TIA TSB-36

12.13.4.4. EIA/TIA TSB-40

12.13.4.5. EIA/TIA TR-67 Draft, Latest Revision

12.13.4.6. The designated port label shall be consistent with port assignment

12.13.4.7. Binding posts shall be clearly and accurately labeled with assigned pair identity

12.13.4.8. All cables shall be dressed in a neat and organized manner and secured to the backboard at the terminal locations, without creating "tightly bound or cinched" cable bundles (per TSB-**36/40/67**)

12.13.4.9. Cable pairs shall be fanned and terminated in a neat and orderly fashion

12.13.4.10. All terminating blocks shall be grounded per manufacturer's recommendations and per the NEC

12.13.4.11. Only the minimum amount of sheathing required to obtain access for termination of individual pairs shall be removed (less than 0.5 inches per TSB-**36/40/67**)

12.13.4.12. Extreme care shall be taken to assure that the "native twist rate" is maintained for all station data UTP wiring pairs at their termination points (note actual twist rate, i.e., twists/inch, will vary for each pair within the EIA/TIA Category-5e/6 station cable)

12.13.5. **Copper Voice Pair Terminations**

12.13.5.1. All pairs shall be terminated on gas-tight terminal blocks per the manufacturer's specific recommendations

12.13.5.1.1. The designated pair count shall be consistent with binding post assignment

12.13.5.1.2. Binding posts shall be clearly and accurately labeled with assigned pair identity

12.13.5.1.3. All cables shall be dressed in a neat and organized manner and secured to the backboard at the terminal locations, without creating "tightly bound or cinched" cable bundles

12.13.5.1.4. Cable pairs shall be fanned and terminated in a neat and orderly fashion

12.13.5.1.5. All terminating blocks shall be grounded per manufacturer's recommendations and per the NEC

12.13.5.1.6. The specific amount of sheathing recommended by the manufacturer for termination of individual pairs shall be removed.

12.13.5.1.7. **Proximity to Backboard Ground planes:** All copper wiring shall be routed as closely as possible to the backboard and cable tray ground planes. Cable management means (e.g., D-rings, etc.) shall be utilized to assure that all cabling will permanently maintain a close proximity to the ground planes.

12.13.5.2. **Additional Cable Length:** A minimum of 12 inches of slack for Cat 5E copper and 1 meter of fiber shall be left in each outlet. For Cat 6 cable, 12 inches of slack for each outlet is required, however, the slack cannot remain in the box behind the outlet. The slack must be loosely coiled and remain in the cable tray. For homerun conduits, the slack must remain in the communications/terminal rooms.

12.13.5.3. **Cable Bonding:** Contractor shall bond the cables metallic sheath/shield to the splice case with the bonding bar assembly provided with the splice case. Contractor shall connect the splice case to the ground with a #6 AWG green copper wire.

12.14. FIBEROPTIC CABLE INSTALLATION

12.14.1. **Fiberoptic Cables:** All fibers shall be installed in a 1" innerduct that shall be contained within existing raceways. One (1) additional 1" innerduct shall be installed in each (inter- and intra-building) conduit used. When existing enclosed raceways are not available, plenum-grade fiberoptic cabling and plenum-grade innerduct shall be utilized per ANSI/NFPA 70. Optical fibers shall be installed from stations to the IDF/MDF as indicated on the Project Drawings.

12.14.1.1. **Execution:** All work described in this section shall be performed in direct accordance with all Occupational Safety and Health Administration (OSHA) regulations and local codes/regulations.

12.14.1.2. **Routing**: Contractor shall route all OSP and riser fiberoptic cables to the equipment racks, through the specified wire management elements. All fiberoptic cable directional changes shall have a gradual sweep to maintain proper bend radii.

12.14.1.3. **Bundling and securing**: All fiberoptic cables shall be uniformly bundled and secured such cables every nine inches. Contractor shall furnish and install all requirements for cable dressing.

12.14.1.4. **Physical Support and Cable Management:** Contractor shall provide physical support and cable management means for all fiber runs and termination points. Particular care shall be exercised to assure that all fiber cables are adequately supported between floors and from floor-sleeves to adjacent patch-panel racks. In all cases the innerduct shall be physically attached to the rack, cabinet, or other physical entity at each end of run of innerduct.

12.14.1.4.1. Precautions

12.14.1.4.1.1. Cable installation personnel shall be familiar with safety

procedures, equipment operation, and the cable manufacturer's installation requirements.

12.14.1.4.1.2. Special attention shall be given to minimum bending radius and maximum pulling tension limitations.

12.14.1.4.1.3. Cable shall be continuous in length throughout the entire project except for predesignated splice points.

12.14.1.4.1.4. Cable shall be pulled with a pulling-eye type that is recommended by the cable manufacturer.

12.14.1.4.1.5. Contractor shall assure that innerducts are restrained in the appropriate pulling configuration with light-duty ties, and longitudinal restraints shall be provided in both directions to prevent migration of the innerducts.

12.14.1.4.1.6. Pull-throughs with severe offsets shall be rigged with two (2) sheaves.

12.14.1.4.1.7. Optical fibers shall be supported periodically along their length (per manufacturer's recommendations) during the installation of long vertical runs.

12.14.1.4.2. **Racking:** All racking components and equipment required shall be supplied by Contractor. The following racking elements shall be adhered to:

12.14.1.4.2.1. Since there is a substantial risk of damage to the optical fibers by careless handling during racking, much care must be exercised in this procedure, especially with regard to observing the minimum bending-radius limit

12.14.1.4.2.2. Slack for racking shall be pulled by hand. Where necessary, intermediate assistance from the adjacent pull-station shall be provided

12.14.1.4.2.3. Cables shall be secured to the proper rack position with plastic cable ties

12.14.1.4.2.4. Excess cable in splicing-cable boxes shall be neatly coiled for storage

12.14.1.4.2.5. Non-terminated cable ends shall be properly sealed to prevent ingress of moisture

12.14.1.4.2.6. After splicing is completed, cable coils shall be racked in a safe location

12.14.1.4.2.7. Identification/warning tags shall be securely attached to the cables in a minimum of two (2) locations in each cable box.

12.15. Cable Preparation: Cable ends shall be prepared in accordance with the manufacturer's recommended methods prior to being pulled into place.

12.15.1. **Installation**

12.15.1.1. Pulling methods and all associated equipment required shall be consistent with the cable manufacturer's recommendations and must be approved by Telecommunications prior to the start of the installation operation.

12.15.1.2. Cable pulling-lubricant shall be used as required and must be acceptable to the cable manufacturer and Telecommunications.

12.15.1.3. Manual intermediate assist may be required on some pulls. The maximum benefit can be obtained when this assistance is applied near the feed-end of the cable, including pushing the cable at the feed point. When pushing the cable, only modest forces may be applied to avoid buckling the cable.

12.15.1.4. The pulling eye/sheath termination hardware on the fiberoptic cable shall not be pulled over any sheaves.

12.15.1.5. When power equipment is used to install the cable, low speeds shall be used, not to exceed 30 meters per minute, with gradual hand-assisted starting. It is desirable to pull entire lengths non-stop.

12.15.1.6. The manufacturer's minimum bending radius and pulling tension limitations shall not be exceeded under any circumstances.

12.16. Optical-Fiber Splices: (Mechanical splices ARE NOT acceptable; fusion splices ARE acceptable only within Outside Plant fiber runs):

12.16.1. The average splice loss of each fiber shall be 0.2 db or less.

12.16.2. Documentation shall be generated to indicate the splice loss of each splice.
12.16.3. Each individual splice shall be secured and protected in a splice organizer, in a neat and organized manner, subject to BIT Telecommunications approval.

12.17. Optical-Fiber Terminations: (Mechanical terminations ARE acceptable):
12.17.1. The average splice loss of each fiber shall be 0.2 db or less.
12.17.2. Documentation shall be generated to indicate the termination loss of each termination.
12.17.3. Patch panels shall be installed at all termination locations to provide functional interface with the multiplexing equipment and as approved by BIT Telecommunications.
12.17.4. The optical fiber cables shall be terminated in patch panels
12.17.5. The installation of patch panels, mounting of hardware, and the methods employed in doing so, shall be consistent with the recommendations of the manufacturer.

12.18. Fiber Optic Cable Slack Storage
12.18.1. Contractor shall coil the following minimum lengths of fiber fiberoptic cable at each termination point:
12.18.1.1. 20-feet in all MDF/IDF fiberoptic patch panels
12.18.1.2. 30-feet coiled in all OSP hand holes, manholes, and cabinets.

12.19. TEST, QUALITY ASSURANCE, AND ACCEPTANCE
12.19.1. **General:** This section defines the provisions for performance testing the copper and fiberoptic BWS. These testing provisions shall assure compliance to this document of the completed BWS installation. No testing is required to be reported during installation. All inspections and test results shall be verified by the signature of the responsible inspector/test engineer on all test data sheets.

12.19.2. **Project BWS Test Plan:** Contractor shall submit Project Test Plan. This plan, subject to BIT Telecommunications approval, shall include:
12.19.2.1. Identification of inspection and test objectives with references to specific sections of this Specification
12.19.2.2. Identification of inspection points and methods
12.19.2.3. Specific test procedures with specific accept/reject criteria for each test procedure.

12.20. On-Site Inspection of Work: BIT Telecommunications reserves the right to make on-site inspections of all work to verify compliance with performance requirements.

12.21. Performance Testing: Contractor shall provide the necessary personnel and test equipment to test and document the BWS materials and installation quality. Test results will be delivered to Telecommunications as described in section 9 of this document.

12.22. ALL FIBEROPTIC CABLE ACCEPTANCE TESTING
12.22.1. **General**:
12.22.1.1. **Fiberoptic cables less than 100 meters:** Power meter testing shall be performed on 100% of the fibers of each cable (less than 100 meters in length) installed by Contractor. Contractor shall perform the following measurement attenuation tests using the Insertion Method. Contractor must first determine a reference measurement to determine the injection power level of the stabilized source. Contractor shall connect the source directly to the optical power level meter using the referenced cable and connection. The reference level shall be checked and documented periodically in dB or dBm through the acceptance tests. The optical source is then connected to the beginning point in the network and the optical power level meter transferred to the remote end by a member of the test crew. The received level at this point will be measured. The measured attenuation shall be obtained by subtracting the reference level from the receive level.
12.22.2. **Power Meter Test Results:** Contractor shall furnish attenuation assessments on each fiber less than 100 meters in each cable in both directions, with the following information:
12.22.2.1. Date of test
12.22.2.2. Name of test personnel
12.22.2.3. Fiber cable type and part number
12.22.2.4. Cable number
12.22.2.5. Fiber number
12.22.2.6. TX wavelength

12.22.2.7. TX location
12.22.2.8. RX location
12.22.2.9. TX model number and serial number
12.22.2.10. RX model number and serial number
12.22.2.11. Overall distance in meters
12.22.2.12. Attenuation dB or dBm

12.22.3. **Fiberoptic cables greater than 100 meters:** Contractor shall test (in one direction) each fiber strand in each cable (installed by Contractor), utilizing an OTDR for both distance (in meters) and attenuation (dB/km) at 850 nm and 1300 nm: The OTDR scope scale shall be such that anomalies of the magnitude of 0:2 dB are readily apparent on the trace: The refractive index will be set and verified in writing and in a certificate of calibration within 60 days prior to the test, as follows:
12.22.3.1.1. Refractive index 1:4776 at 850 nm
12.22.3.1.2. Refractive index 1:4719 at 1300 nm:

12.22.4. **OTDR Test Results:** Contractor shall furnish "tracer recordings" on each fiber strand greater than 100 meters in each and cable in both directions, with the following information:
12.22.4.1. Date of test
12.22.4.2. Name of test personnel
12.22.4.3. Test wavelength
12.22.4.4. Pulse duration(s) and scale range(s)
12.22.4.5. Index of refraction
12.22.4.6. Fiber cable type and part number
12.22.4.7. Cable Number
12.22.4.8. Fiber number
12.22.4.9. Fiber tube and/or fiber strand number
12.22.4.10. Direction of test
12.22.4.11. Overall distance in meters
12.22.4.12. Attenuation in dB or dBm

12.22.5. **Certificate of Calibration:** All test equipment shall have a certificate of calibration from its manufacturer (or certified test laboratory) within 60 days prior to all test dates.

12.22.6. **Pre-Installation Testing Requirements:** When specifically required by the BIT Telecommunications, Contractor shall perform a pre-installation attenuation acceptance test on all fiber cables on the factory reels. Once Contractor has measured the attenuation and has concurred with the factory test results, Contractor shall submit to the BIT Telecommunications both Contractor and factory test results, documenting in writing Contractor's concurrence of the attenuation in all fibers.

12.22.7. **Post Installation Tests:** Contractor shall perform the following tests after placement of all inside and outside plant cable.

12.22.8. **Fiber Segment OTDR Distance and Attenuation Assessments:** When specifically required by the BIT Telecommunications, Contractor shall test each and every fiber strand utilizing an OTDR for distance (in meters) and attenuation (dB/km), prior to splicing. Contractor shall furnish BIT Telecommunications with "tracer recordings" of such tests.

12.22.9. **Link Loss Calculations:** Contractor shall use the length measurements to calculate the loss value for each span or segment, using the pre-installation or factory acceptance test measurement for dB/km.

Example:		
Segment Distance	= 500 m	
Attenuation / unit length	= 3.0 dB/km	
Calculation	= 500 m x 0.0030 dB/m	= 1.5 dB
Splice Loss	= 0.2 dB / splice x 2 splices	= 0.4 dB
Connector Loss	= 0.4 dB / mate x 2 connectors	= 0.8 dB
Segment Link Loss		= 2.7 dB

12.22.10. **Loss Factors:** Contractor shall factor in splice loss (0.2 dB) and mated pair loss (0.4 dB) in determining like loss value and shall reflect each individual loss value in the link loss documentation.

12.22.11. **Usage**: The assessments made by Contractor and furnished to BIT Telecommunications shall be used for the recalculation of link losses that Contractor shall be required to adhere to for final testing

12.22.12. **Final Acceptance Test:** All installed fibers in all installed links shall be tested at 850 nm and 1300 nm for power attenuation (dB/km), using a stabilized light source and OTDR. These tests shall be performed in compliance with Fotec-Fiber Optic System Testing Guide, Single Cable Testing (one way loss). There shall be a jumper added, where applicable, at each end of the link-under-test in order that the end connectors may be validated. Test results shall be reported in terms of "dB-loss" from the transmitting point, through all the patch panel connectors, where applicable, to the receiving end of the link-under-test. Accept/reject criteria, which were developed as part of the acceptance test plan, shall be utilized to determine acceptance of each fiber. 100% of all fibers in each fiberoptic link shall be within test specifications

12.22.13. **Unsatisfactory Test Results:** If any segment of cable is found to have unsatisfactory test results, that specific cable link shall be replaced with a new link of cable. The replacement cable link shall be tested to demonstrate acceptability.

12.23. ALL TWISTED PAIR COPPER BWS TESTING

12.23.1. **Data Cabling System Acceptance Tests:** In no event shall Contractor test by tone. After the cabling is fully installed, Contractor shall perform end-to-end tests (via methods appropriate to the cabling installation) that:

12.23.1.1. Demonstrate complete electrical continuity (no opens)
12.23.1.2. Demonstrate that no improper grounds nor shorts exist within the copper cable plant
12.23.1.3. Demonstrate proper termination (e.g., no reversed-pairs, no split-pairs, crossed pairs, transposed groups, etc.) and proper labeling to the satisfaction of BIT Telecommunications.
12.23.1.4. Establish complete operational integrity for an EIA/TIA Category-5e/6 BWS. These tests shall include specific measurements of all factors that are required for qualification of cable plant to the Category-5e/6 level of performance.
12.23.1.5. Printouts of the test results for all pairs are required for each data cable drop. Acceptable printed output is as generated by the Microtest PentaScanner, or equivalent.
12.23.1.6. All test results for all pairs of all drops shall be within all parameters specified for Category-5e/6 station drops.
12.23.1.7. Test results shall be provided as described in Section 9 of this document.

12.23.2. **Unsatisfactory Test Results:** If any segment of cable is found to have unsatisfactory test results, that specific cable link shall be replaced with a new link. The new cable link shall be tested to demonstrate acceptability to EIA/TIA Category-5e/6 requirements.

12.23.3. **Voice Cabling System Acceptance Tests:** After the cabling is fully installed, Contractor shall perform tests that:

12.23.3.1. Demonstrate complete electrical continuity
12.23.3.2. Demonstrate that no improper grounds nor shorts exist within the copper cable plant
12.23.3.3. Demonstrate proper termination (e.g., no reversed-pairs, no split-pairs, etc.) and proper labeling to the satisfaction of Telecommunications.
12.23.3.4. Printouts of the test results for all pairs are required for each data cable drop. Acceptable printed output is as generated by the Microtest PentaScanner, or equivalent.
12.23.3.5. Test results shall be provided as described in Section 9 of this document.

12.23.4. **Unsatisfactory Test Results:** If any segment of cable is found to have unsatisfactory test results, that specific cable link shall be replaced with a new link. The new cable link shall be

tested to demonstrate acceptability to EIA/TIA Category 5e requirements.

12.24. PHYSICAL SUPPORT AND CABLE MANAGEMENT

12.24.1. **General:** Contractor shall:
- 12.24.1.1. Use cable tray for physical support where available
- 12.24.1.2. Provide physical support and cable management means for all copper and fiber runs (vertical and horizontal), where not provided by others.
- 12.24.1.3. All burrs and sharp edges shall be removed from those portions of the physical support and cable management components that might come into contract with cable.

12.24.2. **Minimum Bend Radius:** No individual cable shall be positioned with a bend radius of less than **8 times its diameter**:
- 12.24.2.1. At power pole inlets
- 12.24.2.2. Within modular furniture raceways
- 12.24.2.3. Transitions from cable trays and equipment rack(s).

12.24.3. **Vertical Supports:**
- 12.24.3.1. Between floors per NEC requirements
- 12.24.3.2. At **8' intervals** maximum.

12.24.4. **Horizontal Supports:**
- 12.24.4.1. MPOP/MDF/IDF to stations via cable hangers, J-hooks, etc. mounted to building structural members
- 12.24.4.2. At **4 to 6 feet intervals** maximum.

12.24.5. **Within Telecommunication Closets:**
- 12.24.5.1. Within MPOP/MDF/IDF via cable tray/ladder
  - 12.24.5.1.1. Between cable tray and equipment rack(s), without stress points, per TSB-**36/40/67** or most recent.

12.25. Equipment Racks

12.25.1. **General**: Each equipment rack must include the furnishing and installation of both horizontal and vertical wire-management systems
- 12.25.1.1. **Vertically:** Each equipment rack shall have vertical wire management. There are two types depending on the application.
  - 12.25.1.1.1. Vertical “D” rings spaced appropriately to manage patch cables.
  - 12.25.1.1.2. Vertical Slotted duct.
    - 12.25.1.1.2.1. Allows for management of front a rear cables.
    - 12.25.1.1.2.2. Removable cover.
    - 12.25.1.1.2.3. Wire retainer holds cable in place when cover is removed
    - 12.25.1.1.2.4. Must run full length of the rack
    - 12.25.1.1.2.5. Example is Panduit part number WMPV3X5.
- 12.25.1.2. **Horizontally:** on each equipment rack/backboard, at maximum intervals of **48** patch-panel ports, must have a horizontal wire-management panel for the floor and wall racks.
- 12.25.1.3. **See Appendix A** for examples

12.26. CABLE TRAY/LADDER/J-HOOK INSTALLATION

12.26.1. **General:** Where drawings require, cable tray/ladder shall be installed for the purpose of supporting and containing all media cables. Where possible all cable tray/ladders shall be installed at one elevation, and shall allow for easy addition and/or removal of cables.

12.26.2. **Components:** Only standard prefabricated elbows, reducers, crossovers, tees, and elevation change tray sections shall be utilized to construct a continuous cable tray/ladder assembly. Acceptable support members include threaded rods, trapeze, and cantilever brackets.

12.26.3. **Code Compliance:** All cable trays/ladders shall be installed per ANSI/IEEE 70 (National Electrical Code), as amended by the local jurisdiction.

12.26.4. **Grounding:** All cable trays/ladders shall be grounded to the nearest building steel and/or continuous cold water pipe.

12.26.5. **Bonding.** All cable tray/ladder segments shall be bonded to each adjacent section of cable tray/ladder. Bonding members shall have cross-sections and utilize connection techniques that provide low impedance in the frequency range from DC to 10 MHz.

12.26.6. **Supports:** All cable tray/ladder assemblies shall be supported from only "local structural elements" and shall be supported at 8' intervals, maximum or per Manufacturer instructions

12.26.7. **Finished surface:** Inside finished surface shall be free of sharp edges, etc. that are capable of damaging cable insulation.

12.26.8. **J-Hooks**: All cables shall be supported from the point that they exit the cable tray/ladder system until they penetrate into the vertical raceways (e.g., wall-mounted conduits, etc.) with a combination of threaded rod and J-hook style hangers, installed 4 to 5 feet apart. Contractor shall furnish and install J-hook supports where required.

12.26.9. **MDF/IDF Backboard and Rack Organization:**

12.26.9.1. General: The various functions shall be arranged in the order established below. Actual layouts shall be per reviewed shop drawings.

12.26.9.2. Backboard, Left to Right Sequence

12.26.9.2.1. Outside fiber terminations
12.26.9.2.2. Outside plant CATV (with cable protectors)
12.26.9.2.3. Copper data riser cables
12.26.9.2.4. Copper data horizontal tie-cables (with cross-connect fields)
12.26.9.2.5. Outside plant copper voice (with cable protectors)
12.26.9.2.6. Voice riser cables
12.26.9.2.7. Voice horizontal tie-cables and station cables (with cross-connect fields)
12.26.9.2.8. Telephone common equipment.

12.26.9.3. Voice Field Layouts

12.26.9.3.1. Layout 2-separate voice fields (A & B) -*When requested by Buyer*
12.26.9.3.2. Voice field “A” is the primary voice field for each drop, and shall be utilized to connect to the “top left” voice workstation drop connector (RJ45)
12.26.9.3.3. Voice field “B” is the secondary voice field for each drop, and shall be utilized to connect to the “top right” voice workstation drop connector (RJ45)

12.26.9.4. **Equipment Rack, Top to Bottom Sequence**

12.26.9.4.1. Vertical fiber terminations
12.26.9.4.2. Copper station cable terminations (patch panels)
12.26.9.4.3. Networking equipment
12.26.9.4.4. Internetworking equipment
12.26.9.4.5. Uninterruptible power system and power strips or power distribution units.
12.26.9.4.6. See Appendix A.

12.26.9.5. **Splice Cases:** Contractor shall install transition splice cases and lateral/riser cable splice cases for all indoor entrance splices. Contractor shall locate splice cases to minimize their impact on the available backboard space and to accommodate protector swivel stubs. Contractor shall perform straight splices. Contractor shall secure all cables in the splice case(s) and the end plates in accordance with manufacturer’s specifications.

12.26.9.6. **Electrical Power:** Electrical power branch circuits contained within grounded metal conduit is the only acceptable form of electrical power conductors which can be attached to the backboards or equipment racks.

12.26.9.7. **WALL & FLOOR PENETRATIONS, SLEEVES AND CONDUITS**

12.26.9.7.1. **Code Compliance:** All wall and floor penetrations shall be installed per ANSI/IEEE 70 (National Electrical Code), as amended by the local jurisdiction.

12.26.9.7.2. **Non-Rated Walls and floors:** Wherever station cables must penetrate a wall, Contractor shall core a 4-inch hole and fit an EMT conduit sleeve in the opening. The conduit sleeve shall extend a minimum of 5-inches on both sides

of the wall. Conduit sleeve shall be fit with a plastic bushing on each end to minimize damage to the cable during the installation process.

12.26.9.7.3. **Rated Walls and floors:** Contractor shall fire stop all sleeves and conduits per specification section 07100.

12.26.9.7.4. **Grounding:** All cable trays/ladders shall be grounded to the nearest building steel.

12.27. Removal of Abandon Cable

12.27.1. During a retrofit installation, all abandon cable shall be removed. Any cable not currently in use that is planned to be used in the future must be tagged at both ends.

13. FIBEROPTIC CABLING

13.1. GENERAL:

13.1.1. Codes: All materials specified herein shall be in direct accordance with the applicable codes:

13.1.1.1. Prior to Delivery of Cable to Jobsite. The following shall be submitted 3-weeks prior to the delivery of the fiberoptic cabling upon request:
13.1.1.1.1. Manufacturer's quality assurance and testing procedures
13.1.1.1.2. Outline drawings, including cross-section and material information including:
13.1.1.1.3. Assembly type
13.1.1.1.4. Strength-member
13.1.1.1.5. Fiber quantities
13.1.1.1.6. Fiber assembly
13.1.1.1.7. Fiber material
13.1.1.1.8. Buffer-tube material and construction
13.1.1.1.9. Cladding material
13.1.1.1.10. Jacketing material

13.1.1.2. Protection: Manufacturer shall use adequate means to protect the product from damage during delivery to the job-site.

13.1.1.3. Replacements: In the event of shipping damage, all affected products shall be replaced at no charge to the Telecommunications.

13.1.1.4. Delivery: All products shall be delivered to the job-site in their original unopened containers, with all labels legible.

13.2. PRODUCTS:

13.2.1. **Fiberoptic Cable:** The fiberoptic cable shall consist of, but not be limited to, glass-fiber sub-cables, dielectric fillers, strength-member, and protective outer sheathing.

13.2.2. **Type:** All cables shall meet ANSI/NFPA-70 requirements and be UL listed for Type OFNP, as specified by the controlling document, and as required by the ANSI/NFPA-70 application requirements and local codes for specific application conditions.

13.2.3. **Construction**: All fiberoptic cables utilized for outside plant applications shall be of the loose tube construction type. All fiberoptic cables utilized for inside plant applications shall be of the tight-buffered construction type.

13.2.4. **Core Design:** Core design shall be no more than six (6) fibers per tube, up to 14 tubes. When more than 14 loose tubes are required to meet the fiber-count, there shall be no more than twelve (12) fibers per tube.

13.2.5. **Sub-cables:** Single fiberoptic sub-cables shall consist of optical fiber(s) surrounded by a synthetic yarn strength-member and a color coded jacket. Each fiber shall have a uniquely colored jacket.

13.2.6. **Tensile Strength-Member**: Fiberoptic cables with more than four (4) sub-cables shall be assembled by:
13.2.6.1.1. Stranding sub-cables and any filler around a central, non-buckling, strength-member, or Support strands surrounding the optical fibers.
13.2.6.1.2. Any given sub-cable: shall contain either 62.5/125 (micron) multimode fibers or single-mode fibers, as specified in the Construction Drawings and Specifications, and required to support the specified connectivity level.

13.2.7. **Outer Jacket**: Fiberoptic cable outer jacket shall be smooth and free from holes, splits, blisters, and other surface flows. Outer jacket shall be plenum rated.

13.2.8. **Surface Markings:** Fiberoptic cable surface markings shall be as required by the NEC for the type of cable, and shall include the cable manufacturer's name. Markings shall be repeated on 18" +/- intervals throughout the length of the cable.

13.3. MULTIMODE FIBEROPTIC CABLE FIBERS:

13.3.1. **Core Type:** Multimode fiberoptic cable fiber-core type shall be graded-index glass.

13.3.2. **Performance Requirements**: Multimode fiberoptic cable fibers shall meet or exceed the following parameters after cabling:

Core Diameter:	62.5 +/-3 microns
Clad Diameter:	125 +/-3 microns
Numerical Aperture:	0.29

Maximum Attenuation per km (-40 to 70 C):

850 nm	4.0 dB
1300 nm	2.5 dB

Minimum Bandwidth:

850 nm	160 MHz
1300 nm	500 MHz

13.4. SINGLE-MODE FIBEROPTIC CABLE FIBERS:

13.4.1. **Core Type:** Single-mode fiberoptic cable fiber-core type shall be graded-index glass.

13.4.2. **Performance Requirements:** Single-mode fiberoptic cable fibers shall meet or exceed the following parameters after cabling:

Mode Field Diameter:	9-11 microns
Core-Clad Offset:	+/-1 micron
Clad Diameter:	125 +/- 3 microns, individual fiber +/- 0.5 micron

Maximum Attenuation per km (-40 to 70 C):

1300 nm	1.0 dB
1500 nm	1.0 dB

Minimum Bandwidth:

1300 nm	600 MHz

Maximum Pulse Dispersion:

1285 to 1330 nm	3.5 PS/nm-km
1530 to 1570 nm	20 PS/nm-km

13.4. OUTSIDE FIBER OPTIC CABLE:

13.4.1. **General:** Outside fiber optic cable shall be suitable for outside use between buildings in a campus environment. It shall be suitable for runs in buried conduits.

13.4.2. **Armor Sheath:** Laminated non-metallic sheath shall be provided.

13.4.3. **Temperature Range:** Minimum cable temperature ranges shall be as follows:

Operating Range:	-20 to 70 C
Storage Range:	-20 to 70 C

13.4.1. **Minimum Pulling Tensile Strength:** Minimum cable pulling tensile strength shall be 2500 newtons (N).

13.4.2. **Maximum outside Diameter:** Maximum cable outside diameter (OD) shall be consistent with its utilization in industry standard innerduct.

13.4.3. **Minimum Bend Radii:** Minimum cable bend radii shall be:

No Load:	8 times cable OD

Maximum Tension: 20 times cable OD

13.4.1. **Fiber ID:** Fibers shall be color coded (by fiber) and marked or color coded by group of fibers.

13.4.2. **Crush Resistance:** Cable crush resistance shall be:
Tight buffer: 300 N/cm
Loose Tube: 50 N/cm

13.4.1. **Cyclic Flex Resistance:** Cable shall be capable of 2000 flex cycles per EIA RS-455, without optical degradation.

13.4.2. **Moisture Resistance**: Fiber optical and mechanical performance shall not be degraded and the cable shall not be damaged in any way by long-term immersion in ground water.

13.4.3. **Fungus Resistance:** Cable outer jacket shall be fungus inert.

13.4.4. **Sunlight/UV Resistance:** Cable outer jacket shall be suitable for long-term exposure to sunlight and weather, with a life expectancy greater than 20 years.

13.5. Outside Plant Fiberoptic Cable:

13.5.1. **Outside plant fiberoptic cable:** shall be AT&T 3BFX or equivalent. Outside plant fiberoptic cable is not required to be *"gel filled".* Short run e.g. as between buildings of less than 100 meters where continuous conduit is provided.

13.6. INSIDE FIBEROPTIC CABLE:

13.6.1. **INSIDE FIBEROPTIC CABLE:** shall be suitable for intra-building use, per the NEC. It shall be suitable for runs in metallic conduits, nonmetallic conduits, and innerduct-only runs.

13.6.2. **Sheath:** Polyethylene or copolymer sheath shall be provided per NEC requirements for the specific application, e.g., plenum or non-plenum grades.

13.6.3. **Temperature Range**: Minimum cable temperature ranges shall be as follows:
Operating Range: -20 to 70 C
Storage Range: -20 to 70 C.

13.6.4. **Minimum Pulling Tensile Strength:** Minimum cable pulling tensile strength shall be 2500 newtons (N).

13.6.5. **Maximum outside Diameter:** Maximum cable outside diameter (OD) shall be consistent with its utilization in industry standard innerduct.

13.6.6. **Minimum Bend Radii:** Minimum cable bend radii shall be:
No Load: 8 times cable OD
Maximum Tension: 20 times cable OD.

13.6.7. **Fiber Identification:** Fiber identification shall be by color coding (by fiber) and marked or color coded by group.

13.6.8. **Crush Resistance:** Cable crush resistance shall be:
Tight buffer: 300 N/cm
Loose Tube: 50 N/cm.

13.6.9. **Cyclic Flex Resistance:** Cable shall be capable of 2000 flex cycles per EIA RS-455, without optical degradation.

13.6.10. **Moisture Resistance:** Fiber optical and mechanical performance shall not be degraded and the cable shall not be damaged in any way by long-term immersion in ground water.

13.6.11. **Fungus Resistance:** Cable outer jacket shall be fungus inert.

13.6.12. **Riser Fiberoptic Cable:** Riser fiberoptic cable shall be AT&T 3AEX Series or equal, per ANSI/NFPA-70 Art. 770-6 or more recent.

13.6.13. **Workstation Fiberoptic Cable:** Workstation fiberoptic cable shall be AT&T LGBC Series or equivalent, per ANSI/NFPA-70 or more recent.

13.6.14. **Patch-Cable Fiberoptic Cable:** Patch-cable fiberoptic cable shall be AT&T type 1860A, 1861A, or equivalent.

14. COPPER COMMUNICATIONS CABLING

14.1. GENERAL:

14.1.1. **Specification:** This specification defines copper cabling for outside-plant and inside-plant applications. Actual usage of cable types and quantities of conductors shall be as stated in the Contract Documents and as required for the described physical connectivity requirements.

14.1.2. **Applicable Documents:**

14.1.2.1. **Codes:** All materials specified herein shall be in direct accordance with the following codes:

14.1.2.1.1. Local Codes:
14.1.2.1.2. City/County Codes
14.1.2.1.3. Codes Applicable for State Wherein Project Work is performed.
14.1.2.1.4. ANSI/NFPA-70 (National Electrical Code):
14.1.2.1.5. Article 800, Plenum Ratings

14.1.3. **Standards:** All materials specified herein shall meet or exceed the following standards:

14.1.3.1. American National Standards Institute (ANSI)
14.1.3.2. Underwriters Laboratories, Inc. (UL)
14.1.3.3. UL 444: Communications Cabling
14.1.3.4. UL 910: Flammability tests
14.1.3.5. UL 969: Standard for Marking and Labeling Systems.
14.1.3.6. Electronic Industries Association (EIA):
14.1.3.7. EIA/TIA 568 or most recent Commercial Building Wiring Standard for Category 5
14.1.3.8. EIA/TIA 568/568A or most recent with current draft addendum at time of purchase, Specifications for Category 5e
14.1.3.9. EIA/TIA 568/568A or most recent with current draft addendum at time of purchase, Specifications for Category 6

14.1.4. **QUALITY ASSURANCE:**

14.1.4.1. **Requirements:** 100% of the copper conductors shall be within specifications. All cable shall meet or exceed the requirements of this section.

14.1.4.2. **Qualifications of Fabricators:** Product shall be produced by manufacturers regularly engaged in the manufacture of similar items and with a history of successful production acceptable to BIT Telecommunications.

14.1.5. **SUBMITTALS:**

14.1.5.1. **General:** The following submittals shall be made per the project schedule upon request.

14.1.5.1.1. **Offer:** The following shall be submitted upon request:

14.1.5.1.1.1. Complete description and product data for the copper cabling including:

14.1.5.1.1.1.1. Conductor size and quantity of pairs
14.1.5.1.1.1.2. Insulation outside diameter (OD) and sheath OD
14.1.5.1.1.1.3. Third party test data (UL, etc.) showing EIA/TIA compliance to required "CATEGORY" rating.
14.1.5.1.1.1.4. Third party EIA/TIA Category-Rating test results.

14.1.6. **WARRANTY:**

14.1.6.1. **General:** All cabling shall be warranted by the manufacturer for a minimum period of ten (10) years.

14.1.7. **PRODUCT HANDLING:**

14.1.7.1. **Protection:** Manufacturer shall use adequate means to protect the product from damage during delivery to the job-site.

14.1.7.2. **Replacements:** In the event of shipping damage, all affected products shall be

replaced at no charge to Telecommunications.

14.1.7.3. **Delivery:** All products shall be delivered to the job-site in their original unopened containers, with all labels legible.

14.2. PRODUCTS:

14.2.1. **Construction elements:** The copper cable shall consist of, but not be limited to, copper conductor and dielectric insulation, with color codes as required. Copper cable shall be suitable for intra-building use, per the ANSI/NFPA-70 or most recent.

14.2.2. **Type:** All cables shall meet the 1993 National Electrical Code or most recent and be UL listed for the Types as required by the ANSI/NFPA-70 per application, location, and service conditions.

14.2.3. **Outer Jacket:** Copper cable outer jacket shall be smooth and free from holes, splits, blisters, and other surface flows. Sheath shall be provided per ANSI/NFPA-70 or most recent requirements for the specific application, e.g., general purpose, riser, or plenum.

14.2.4. **Surface Markings:** Copper cable surface markings shall be as required by the ANSI/NFPA-70 or most recent for the type of cable, and shall include the cable manufacturer's name. Markings shall be repeated on 18" +/- intervals throughout the length of the cable.

14.2.5. **Moisture Resistance:** Electrical and mechanical performance shall not be degraded and the cable shall not be damaged in any way by long-term exposure to 95% RH, with condensation.

14.2.6. **Fungus Resistance:** Cable outer jacket shall be fungus inert.

14.2.7. **Sunlight/UV Resistance:** Cable outer jacket shall be suitable for long-term exposure to sunlight and weather, with a life expectancy greater than 20 years.

14.2.8. **Temperature Range:** Minimum cable temperature ranges shall be as follows:

Operating Range:	-20 to 70 C
Storage Range:	-20 to 70 C.

14.2.9. BACKBONE COPPER CABLE:

14.2.9.1. **Ratings:** Riser copper cable shall be per BELL DESIGN, with:

Non-Plenum (outside plant only):	UL types CM or CMR, per ANSI/NFPA-70 Article 800-3(d)
Plenum:	UL type CMP, per ANSI/NFPA-70 Article 800-3(d).

14.2.9.2. **Characteristics:** Riser copper cable shall have the following characteristics:

Gauge:	24 AWG
Impedance:	100 ohms above 1 MHz, nominal
Attenuation:	0.8 dB/100 ft
Mutual Capacitance:	18 pF/ft, Maximum.

14.2.10. WORKSTATION COPPER CABLES

14.2.10.1. **General:** Copper workstation cabling is grouped as follows:

14.2.10.1.1. Voice Workstation Copper Cable (new):

14.2.10.1.2. **Ratings:** Voice workstation copper cable shall be rated as EIA/TIA TSB-36 Category 5e or greater:
Plenum: UL type CMP, per ANSI/NFPA-70 Article 800-3(d) or most recent.

14.2.10.1.3. **Characteristics:** Voice workstation copper cable shall have the following characteristics:

Gauge:	24 AWG
Impedance:	100 ohms above 1 MHz, nominal
Attenuation:	0.8 dB/100 ft
Mutual Capacitance:	18 pF/ft. Maximum.

14.2.10.1.4. Unshielded Twisted Pair (UTP) Data Workstation Cabling:

14.2.10.1.5. **Ratings:** UTP workstation data cable shall be EIA/TIA TSB-36 Category-5e/6, equivalent to:
Plenum: UL type CMP, as per ANSI/NFPA-70 Article 800-3(d) or most recent.

14.2.10.1.6. **Characteristics:** UTP workstation data cable shall have the following characteristics:

Gauge:	24 AWG
DC Resistance (Nom):	20-30 Ohms/1000 ft
Impedance (Nom):	100 +/-15 ohms from 1 to 16 MHz

14.2.10.1.7. **Manufacturers: T**he following manufacturers are acceptable:
14.2.10.1.7.1. MoHawk, Berk-Tek, Belden or approved by BIT Telecommunications

14.2.10.2. Patch-Cable Copper Cable:

14.2.10.2.1. **General:** All data patch-cables shall utilize twisted pair cabling, with stranded copper conductors, and having an EIA/TIA TSB-36 Category-5e/6 rating. Cables shall be inspected specifically for the maintenance of the required level twisting at each connector location. Untwisted (e.g., silver satin) patch cords are expressly not allowed. Unshielded patch-cable copper cables shall be as follows:

14.2.10.2.1.1. **Unshielded Data Patch-Cables:** Shall be UL types CM or CMR. Conductor size shall be 24 AWG.

14.2.10.2.1.2. **Unshielded Voice Patch-Cables:** Shall be AT&T DIW, or equivalent UL types CM or CMR. Conductor size shall be 24 AWG.

14.2.10.2.1.3. **Voice Cross-Connect Wire:** Voice cross-connect wire for voice applications only, shall be AT&T type F or equivalent, with:

Gauge:	24 AWG
DC Resistance:	50 ohm, nominal
Mutual Capacitance:	0.015 mF/1000 ft, Max.

14.2.10.2.1.4. **Data Cross-Connect Wire:** Data cross-connect wire for all data applications, shall be Category-5e/6.

14.2.10.2.1.5. **Ground Wire:** Ground wire shall be 6-AWG, stranded copper, with (green) insulation per the ANSI/NFPA-70 or most recent for the service conditions.

14.2.10.2.1.6. **Outside-Plant Cable:** Outside-plant cable shall be per "BELL DESIGN" GFMW, with:

Gauge:	24 AWG
DC Resistance:	144 ohms/sheath mile
Attenuation:	6 dB/1000 ft at 1 MHz, nominal
Mutual capacitance:	90 nF at 1 kHz.

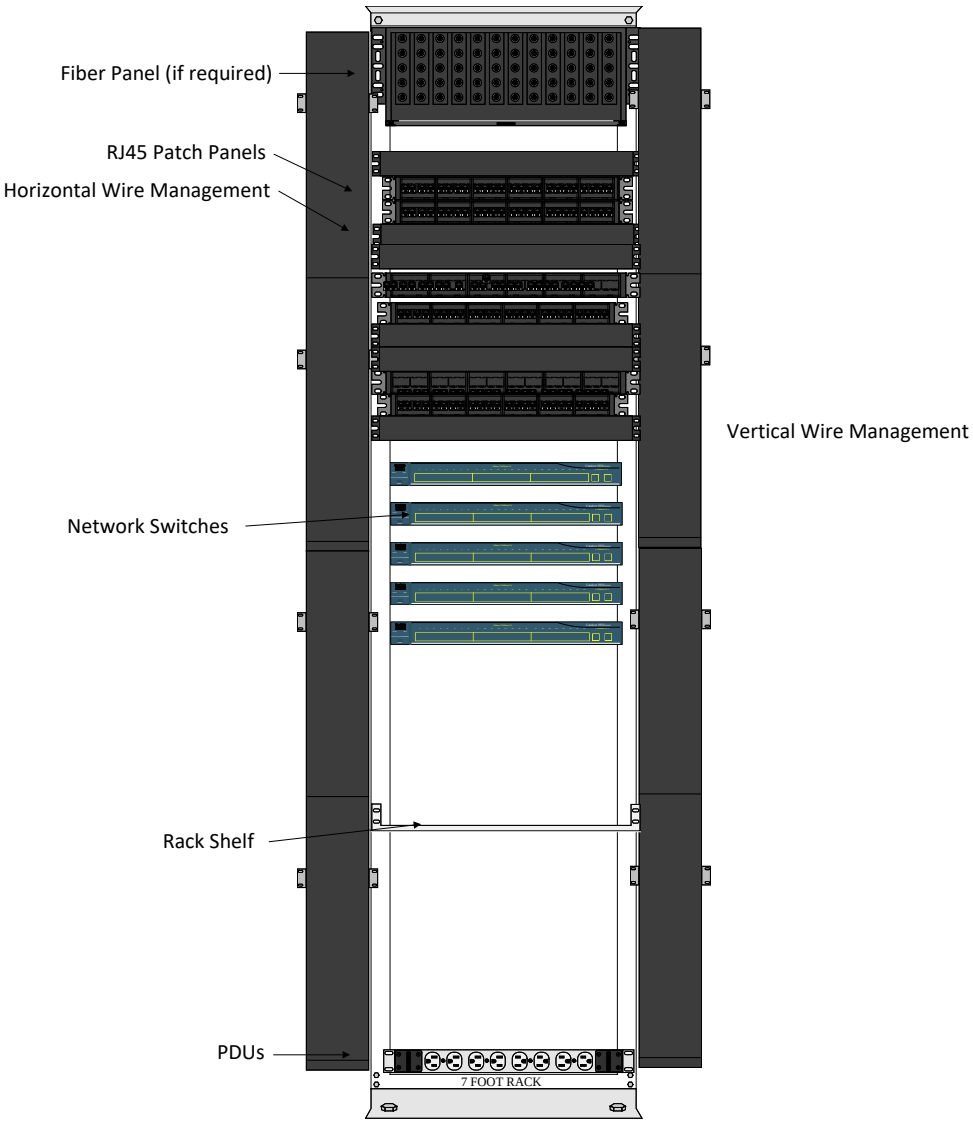
14.2.10.2.1.7. **Coax Cable:** Coax CATV cable shall be RG6, with:

Jacket:	Plenum rated
Impedance:	75 ohm.

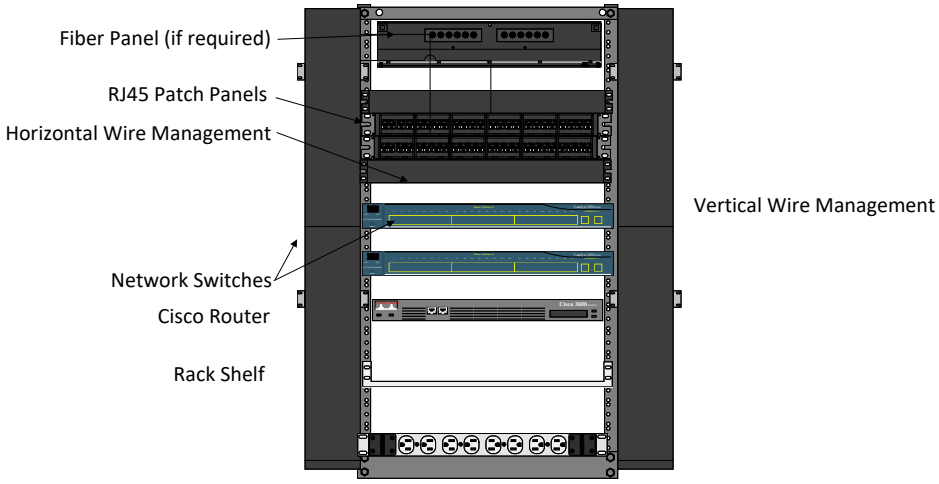
Manhattan M44212F Coax is preferred, or pre approved equivalent.

Appendix A

7 foot Floor Rack
Configuration A



36 inch Wall Rack
Configuration A



36 inch Wall Rack
Configuration B